DEPARTMENT OF VETERANS AFFAIRS

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SECTION 00 01 15
LIST OF DRAWING SHEETS

The drawings listed below accompanying this specification form a part of the contract.

Drawing No.	Title
	ARCHITECTURAL
5-AS1	Roof Plan – Building 5
6-AS2	Roof Plan – Building 6
7-AS3	Roof Plan – Building 7
10-AS4	Roof Plan – Building 10
11-AS5	Roof Plan – Building 11
12-AS6	Roof Plan – Building 12
13-AS7	Roof Plan – Building 13
16-AS8	Roof Plan – Building 16
19-AS9	Roof Plan – Building 19
20-AS10	Roof Plan – Building 20
CC-AS11	Roof Plan – Connecting Corridor

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SECTION 01 00 00
GENERAL REQUIREMENTS

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SECTION 01 00 00
GENERAL REQUIREMENTS

1.1 GENERAL INTENTION

A. Contractor shall completely prepare site for building operations, including demolition and removal of existing roofing, and furnish labor and materials and perform work for reroofing buildings 5-7, 10-13, 16, 19, 20 and connecting corridors as required by drawings and specifications.

B. Offices of Howard + Helmer architecture, as Architect-Engineers, will render certain technical services during construction. Such services shall be considered as advisory to the Government and shall not be construed as expressing or implying a contractual act of the Government without affirmations by Contracting Officer or his duly authorized representative.

C. All employees of general contractor and subcontractors shall comply with VA security management program and obtain permission of the VA police, be identified by project and employer, and restricted from unauthorized access.

D. Prior to commencing work, general contractor shall provide proof that a OSHA certified “competent person” (CP) (29 CFR 1926.20(b)(2) will maintain a presence at the work site whenever the general or subcontractors are present.

E. Training:

1. All employees of general contractor or subcontractors shall have the 10-hour OSHA certified Construction Safety course and /or other relevant competency training, as determined by VA CP with input from the ICRA team.
2. Submit training records of all such employees for approval before the start of work.

1.2 STATEMENT OF BID ITEM(S)

A. ITEM 1: Work includes reroofing, and necessary removal of existing construction and certain other items for Buildings 5-7, 10-13, 16, 19, 20 and Connecting Corridor.

B. ITEM 2: All work in Bid Item 1 except work at Building 20.

C. ITEM 3: All work in Bid Item 2 except work at Building 11.

D. ITEM 4: All work in Bid Item 3 except work at Building 10.

E. ITEM 5: All work in Bid Item 4 except work at Building 16.

F. ITEM 6: All work in Bid Item 5 except work at Building 13.

G. ITEM 7: All work in Bid Item 6 except work at Building 12.

1.3 SPECIFICATIONS AND DRAWINGS FOR CONTRACTOR

A. AFTER AWARD OF CONTRACT, 10 sets of specifications and drawings will be furnished. These drawings and specifications will consist of those returned by prospective bidders.

B. Additional sets of drawings may be made by the Contractor, at Contractor's expense, from reproducible prints furnished by Issuing Office. Such prints shall be returned to the Issuing Office immediately after printing is completed.

1.4 CONSTRUCTION SECURITY REQUIREMENETS

A. Security Plan:
   1. The security plan defines both physical and administrative security procedures that will remain effective for the entire duration of the project.
   2. The General Contractor is responsible for assuring that all sub-contractors working on the project and their employees also comply with these regulations.

B. Security Procedures:
   1. General Contractor’s employees will not be required to be badged.
   2. No photography of VA premises is allowed without written permission of the Contracting Officer.
   3. VA reserves the right to close down or shut down the project site and order General Contractor’s employees off the premises in the event of a national emergency. The General Contractor may return to the site only with the written approval of the Contracting Officer.

C. Motor Vehicle Restrictions
   1. General Contractor and its employees shall park in designated areas only.

1.5 FIRE SAFETY

A. Applicable Publications: Publications listed below form part of this Article to extent referenced. Publications are referenced in text by basic designations only.
   1. American Society for Testing and Materials (ASTM):
      E84-2008 .....Surface Burning Characteristics of Building Materials
   2. National Fire Protection Association (NFPA):
      10-2006 .....Standard for Portable Fire Extinguishers
      30-2007 .....Flammable and Combustible Liquids Code
      51B-2003 .....Standard for Fire Prevention During Welding, Cutting and Other Hot Work
      70-2007 .....National Electrical Code
      241-2004 .....Standard for Safeguarding Construction, Alteration, and Demolition Operations
   3. Occupational Safety and Health Administration (OSHA):
      29 CFR 1926 .....Safety and Health Regulations for Construction

B. Fire Safety Plan: Establish and maintain a fire protection program in accordance with 29 CFR 1926. Prior to start of work, prepare a plan detailing project-specific fire safety measures, including periodic status reports, and submit to the COTR and Facility Safety Officer for review for compliance with contract requirements in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA AND SAMPLES Prior to any worker for the contractor or subcontractors beginning work, they shall undergo a safety briefing provided by the general contractor's competent person per OSHA requirements. This briefing shall include information on the construction limits, VAMC safety guidelines, means of egress, break areas, work hours, locations of restrooms, use of VAMC equipment, etc. Documentation shall be provided to the COTR that individuals have undergone contractor's safety briefing.
C. Site and Building Access: Maintain free and unobstructed access to facility emergency services and for fire, police and other emergency response forces in accordance with NFPA 241.
D. Separate temporary facilities, such as trailers, storage sheds, and dumpsters, from existing buildings and new construction by distances in accordance with NFPA 241. For small facilities with less than 6 m (20 feet) exposing overall length, separate by 3m (10 feet).
E. Temporary Heating and Electrical: Install, use and maintain installations in accordance with 29 CFR 1926, NFPA 241 and NFPA 70.
F. Means of Egress: Do not block exiting for occupied buildings, including paths from exits to roads. Minimize disruptions and coordinate with COTR and facility Safety Officer.
G. Egress Routes for Construction Workers: Maintain free and unobstructed egress. Inspect daily. Report findings and corrective actions weekly to COTR and facility Safety Officer.
H. Fire Extinguishers: Provide and maintain extinguishers in construction areas and temporary storage areas in accordance with 29 CFR 1926, NFPA 241 and NFPA 10.
I. Flammable and Combustible Liquids: Store, dispense and use liquids in accordance with 29 CFR 1926, NFPA 241 and NFPA 30.
J. Existing Fire Protection: Do not impair automatic sprinklers, smoke and heat detection, and fire alarm systems, except for portions immediately under construction, and temporarily for connections. Provide fire watch for impairments more than 4 hours in a 24-hour period. Request interruptions in accordance with Article, OPERATIONS AND STORAGE AREAS, and coordinate with COTR and facility Safety Officer. All existing or temporary fire protection systems

(fire alarms, sprinklers) located in construction areas shall be tested as coordinated with the medical center. Parameters for the testing and results of any tests performed shall be recorded by the medical center and copies provided to the COTR.

K. Smoke Detectors: Prevent accidental operation. Remove temporary covers at end of work operations each day. Coordinate with COTR and facility Safety Officer.

L. Hot Work: Perform and safeguard hot work operations in accordance with NFPA 241 and NFPA 51B. Coordinate with COTR. Obtain permits from facility Safety Officer.

M. Fire Hazard Prevention and Safety Inspections: Inspect entire construction areas weekly. Coordinate with, and report findings and corrective actions weekly to COTR and facility Safety Officer.

N. Smoking: Smoking is prohibited in and adjacent to construction areas inside existing buildings and additions under construction. In separate and detached buildings under construction, smoking is prohibited except in designated smoking rest areas.

O. Dispose of waste and debris in accordance with NFPA 241. Remove from buildings daily.

P. Perform other construction, alteration and demolition operations in accordance with 29 CFR 1926.

1.6 OPERATIONS AND STORAGE AREAS

A. The Contractor shall confine all operations (including storage of materials) on Government premises to areas authorized or approved by the Contracting Officer. The Contractor shall hold and save the Government, its officers and agents, free and harmless from liability of any nature occasioned by the Contractor's performance.

B. Temporary buildings (e.g., storage sheds, shops, offices) and utilities may be erected by the Contractor only with the approval of the Contracting Officer and shall be built with labor and materials furnished by the Contractor without expense to the Government. The temporary buildings and utilities shall remain the property of the Contractor and shall be removed by the Contractor at its expense upon completion of the work. With the written consent of the Contracting Officer, the buildings and utilities may be abandoned and need not be removed.

C. The Contractor shall, under regulations prescribed by the Contracting Officer, use only established roadways, or use temporary roadways constructed by the Contractor when and as authorized by the Contracting Officer. When materials are transported in prosecuting the work, vehicles shall not be loaded beyond the loading capacity recommended by the manufacturer of the vehicle or prescribed by any Federal, State, or local law or regulation. When it is necessary to

cross curbs or sidewalks, the Contractor shall protect them from damage. The Contractor shall repair or pay for the repair of any damaged curbs, sidewalks, or roads.

D. Working space and space available for storing materials shall be as determined by the COTR.
E. Execute work in such a manner as to interfere as little as possible with work being done by others. Keep roads clear of construction materials, debris, standing construction equipment and vehicles at all times.
F. Execute work so as to interfere as little as possible with normal functioning of Medical Center as a whole, including operations of utility services, fire protection systems and any existing equipment, and with work being done by others. Use of equipment and tools that transmit vibrations and noises through the building structure, are not permitted in buildings that are occupied, during construction, jointly by patients or medical personnel, and Contractor's personnel, except as permitted by COTR where required by limited working space.
   1. Do not store materials and equipment in other than assigned areas.
   2. Schedule delivery of materials and equipment to immediate construction working areas within buildings in use by Department of Veterans Affairs in quantities sufficient for not more than two work days. Provide unobstructed access to Medical Center areas required to remain in operation.
G. Phasing: To insure such executions, Contractor shall furnish the COTR with a schedule of approximate dates on which the Contractor intends to accomplish work in each specific area of site, building or portion thereof. In addition, Contractor shall notify the COTR two weeks in advance of the proposed date of starting work in each specific area of site, building or portion thereof. Arrange such dates to insure accomplishment of this work in successive phases mutually agreeable to COTR and Contractor.
   1. Contractor shall take all measures and provide all material necessary for protecting existing equipment and property in affected areas of construction against dust and debris, so that equipment and affected areas to be used in the Medical Centers operations will not be hindered. Contractor shall permit access to Department of Veterans Affairs personnel and patients through other construction areas which serve as routes of access to such affected areas and equipment. Coordinate alteration work in areas occupied by Department of Veterans Affairs so that Medical Center operations will continue during the construction period.
H. Utilities Services: Maintain existing utility services for Medical Center at all times. Provide temporary facilities,

labor, materials, equipment, connections, and utilities to assure uninterrupted services. Where necessary to cut existing water, steam, gases, sewer or air pipes, or conduits, wires, cables, etc. of utility services or of fire protection systems and communications systems (including telephone), they shall be cut and capped at suitable places where shown; or, in absence of such indication, where directed by COTR.

1. No utility service such as water, gas, steam, sewers or electricity, or fire protection systems and communications systems may be interrupted without prior approval of COTR. Electrical work shall be accomplished with all affected circuits or equipment de-energized.
2. Contractor shall submit a request to interrupt any such services to COTR, in writing, 48 hours in advance of proposed interruption. Request shall state reason, date, exact time of, and approximate duration of such interruption.
3. Contractor will be advised (in writing) of approval of request, or of which other date and/or time such interruption will cause least inconvenience to operations of Medical Center. Interruption time approved by Medical Center may occur at other than Contractor's normal working hours.
4. Major interruptions of any system must be requested, in writing, at least 15 calendar days prior to the desired time and shall be performed as directed by the COTR.
5. In case of a contract construction emergency, service will be interrupted on approval of COTR. Such approval will be confirmed in writing as soon as practical.
6. Whenever it is required that a connection fee be paid to a public utility provider for new permanent service to the construction project, for such items as water, sewer, electricity, gas or steam, payment of such fee shall be the responsibility of the Government and not the Contractor.

I. To minimize interference of construction activities with flow of Medical Center traffic, comply with the following:
   1. Keep roads, walks and entrances to grounds, to parking and to occupied areas of buildings clear of construction materials, debris and standing construction equipment and vehicles.
   2. Method and scheduling of required cutting, altering and removal of existing roads, walks and entrances must be approved by the COTR.

J. Coordinate the work for this contract with other construction operations as directed by COTR. This includes the scheduling of traffic and the use of roadways, as specified in Article, USE OF ROADWAYS.

1.7 ALTERATIONS

A. Survey: Before any work is started, the Contractor shall make a thorough survey with the COTR areas of buildings in which alterations occur and areas which are anticipated routes of access, and furnish a report, signed by both, to the Contracting Officer. This report shall list by rooms and spaces:
   1. Existing condition of doors, windows, walls and other surfaces not required to be altered throughout affected areas of buildings.
   2. Existence and conditions of items such required by drawings to be either reused or relocated, or both.
   3. Shall note any discrepancies between drawings and existing conditions at site.
   4. Shall designate areas for working space, materials storage and routes of access to areas within buildings where alterations occur and which have been agreed upon by Contractor and COTR.

B. Any items required by drawings to be either reused or relocated or both, found during this survey to be nonexistent, or in opinion of COTR, to be in such condition that their use is impossible or impractical, shall be furnished and/or replaced by Contractor with new items in accordance with specifications which will be furnished by Government. Provided the contract work is changed by reason of this subparagraph B, the contract will be modified accordingly, under provisions of clause entitled "DIFFERING SITE CONDITIONS" (FAR 52.236-2) and "CHANGES" (FAR 52.243-4 and VAAR 852.236-88) of the GENERAL CONDITIONS.

C. Re-Survey: Thirty days before expected partial or final inspection date, the Contractor and COTR together shall make a thorough re-survey of the areas of buildings involved. They shall furnish a report on conditions then existing, of doors, windows, walls and other surfaces as compared with conditions of same as noted in first condition survey report:
   1. Re-survey report shall also list any damage caused by Contractor to such surfaces, despite protection measures; and, will form basis for determining extent of repair work required of Contractor to restore damage caused by Contractor's workmen in executing work of this contract.

D. Protection: Provide the following protective measures:
   1. Wherever existing roof surfaces are disturbed they shall be protected against water infiltration. In case of leaks, they shall be repaired immediately upon discovery.
   2. Temporary protection against damage for portions of existing structures and grounds where work is to be done, materials handled and equipment moved and/or relocated.
   3. Protection of interior of existing structures at all times, from damage, dust and weather inclemency. Wherever

work is performed, floor surfaces that are to remain in place shall be adequately protected prior to starting work, and this protection shall be maintained intact until all work in the area is completed.

1.8 INFECTION PREVENTION MEASURES

A. Implement the requirements of VAMC's Infection Control Risk Assessment (ICRA) team. ICRA Group may monitor dust in the vicinity of the construction work and require the Contractor to take corrective action immediately if the safe levels are exceeded.

B. Establish and maintain a dust control program as part of the contractor's infection preventive measures in accordance with the guidelines provided by ICRA Group. Prior to start of work, prepare a plan detailing project-specific dust protection measures, including periodic status reports, and submit to Resident, Engineer and Facility ICRA team for review for compliance with contract requirements in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA AND SAMPLES.
   1. All personnel involved in the construction or renovation activity shall be educated and trained in infection prevention measures established by the medical center.

C. Medical center Infection Control personnel shall monitor for airborne disease (e.g. aspergillosis) as appropriate during construction. A baseline of conditions may be established by the medical center prior to the start of work and periodically during the construction stage to determine impact of construction activities on indoor air quality. In addition:
   1. The COTR and VAMC Infection Control personnel shall review pressure differential monitoring documentation to verify that pressure differentials in the construction zone and in the patient-care rooms are appropriate for their settings. The requirement for negative air pressure in the construction zone shall depend on the location and type of activity. Upon notification, the contractor shall implement corrective measures to restore proper pressure differentials as needed.
   2. In case of any problem, the medical center, along with assistance from the contractor, shall conduct an environmental assessment to find and eliminate the source.

D. In general, following preventive measures shall be adopted during construction to keep down dust and prevent mold.
   1. Dampen debris to keep down dust and provide temporary construction partitions in existing structures where directed by COTR. Blank off ducts and diffusers to prevent circulation of dust into occupied areas during construction.

1.9 DISPOSAL AND RETENTION

A. Materials and equipment accruing from work removed and from demolition of buildings or structures, or parts thereof, shall be disposed of as follows:
   1. Reserved items which are to remain property of the Government are noted on drawings or in specifications as items to be stored. Items that remain property of the Government shall be removed or dislodged from present locations in such a manner as to prevent damage which would be detrimental to re-installation and reuse. Store such items where directed by COTR.
   2. Items not reserved shall become property of the Contractor and be removed by Contractor from Medical Center.
   3. Items of portable equipment and furnishings located in the area in which work is to be done under this contract shall remain the property of the Government. When areas are vacated by the Department of Veterans Affairs during the alteration period, such items which are NOT required by drawings and specifications to be either relocated or reused will be removed by the Government in advance of work to avoid interfering with Contractor's operation.

1.10 PROTECTION OF EXISTING VEGETATION, STRUCTURES, EQUIPMENT, UTILITIES, AND IMPROVEMENTS

A. The Contractor shall preserve and protect all structures, equipment, and vegetation (such as trees, shrubs, and grass) on or adjacent to the work site, which are not to be removed and which do not unreasonably interfere with the work required under this contract. The Contractor shall only remove trees when specifically authorized to do so, and shall avoid damaging vegetation that will remain in place. If any limbs or branches of trees are broken during contract performance, or by the careless operation of equipment, or by workmen, the Contractor shall trim those limbs or branches with a clean cut and paint the cut with a tree-pruning compound as directed by the Contracting Officer.

B. The Contractor shall protect from damage all existing improvements and utilities at or near the work site and on adjacent property of a third party, the locations of which are made known to or should be known by the Contractor. The Contractor shall repair any damage to those facilities, including those that are the property of a third party, resulting from failure to comply with the requirements of this contract or failure to exercise reasonable care in performing the work. If the Contractor fails or refuses to repair the damage promptly, the Contracting Officer may have

the necessary work performed and charge the cost to the Contractor.

1.11 RESTORATION

A. Remove, cut, alter, replace, patch and repair existing work as necessary to install new work. Except as otherwise shown or specified, do not cut, alter or remove any structural work, and do not disturb any ducts, plumbing, steam, gas, or electric work without approval of the COTR. Existing work to be altered or extended and that is found to be defective in any way, shall be reported to the COTR before it is disturbed. Materials and workmanship used in restoring work, shall conform in type and quality to that of original existing construction, except as otherwise shown or specified.

B. Upon completion of contract, deliver work complete and undamaged. Existing work (walls, ceilings, partitions, floors, mechanical and electrical work, lawns, paving, roads, walks, etc.) disturbed or removed as a result of performing required new work, shall be patched, repaired, reinstalled, or replaced with new work, and refinished and left in as good condition as existed before commencing work.

C. At Contractor's own expense, Contractor shall immediately restore to service and repair any damage caused by Contractor's workmen to existing piping and conduits, wires, cables, etc., of utility services or of fire protection systems and communications systems (including telephone) which are indicated on drawings and which are not scheduled for discontinuance or abandonment.

D. Expense of repairs to such utilities and systems not shown on drawings or locations of which are unknown will be covered by adjustment to contract time and price in accordance with clause entitled "CHANGES" (FAR 52.243-4 and VAAR 852.236-88) and "DIFFERING SITE CONDITIONS" (FAR 52.236-2) of the GENERAL CONDITIONS.

1.12 LAYOUT OF WORK

A. The Contractor shall lay out the work from Government established base lines and bench marks, indicated on the drawings, and shall be responsible for all measurements in connection with the layout. The Contractor shall furnish, at Contractor's own expense, all stakes, templates, platforms, equipment, tools, materials, and labor required to lay out any part of the work. The Contractor shall be responsible for executing the work to the lines and grades that may be established or indicated by the Contracting Officer. The Contractor shall also be responsible for maintaining and preserving all stakes and other marks established by the Contracting Officer until authorized to remove them. If such marks are destroyed by the Contractor or through

Contractor's negligence before their removal is authorized, the Contracting Officer may replace them and deduct the expense of the replacement from any amounts due or to become due to the Contractor.

(FAR 52.236-17)

1.13 AS-BUILT DRAWINGS

A. The contractor shall maintain two full size sets of as-built drawings which will be kept current during construction of the project, to include all contract changes, modifications and clarifications.
B. All variations shall be shown in the same general detail as used in the contract drawings. To insure compliance, as-built drawings shall be made available for the COTR's review, as often as requested.
C. Contractor shall deliver two approved completed sets of as-built drawings to the COTR within 15 calendar days after each completed phase and after the acceptance of the project by the COTR.
D. Paragraphs A, B, & C shall also apply to all shop drawings.

1.14 USE OF ROADWAYS

A. For hauling, use only established public roads and roads on Medical Center property. When necessary to cross curbing, sidewalks, or similar construction, they must be protected by well-constructed bridges.

1.15 TEMPORARY TOILETS

A. Provide where directed, (for use of all Contractor's workmen) ample temporary sanitary toilet accommodations with suitable sewer and water connections; or, when approved by COTR, provide suitable dry closets where directed. Keep such places clean and free from flies, and all connections and appliances connected therewith are to be removed prior to completion of contract, and premises left perfectly clean.

1.16 AVAILABILITY AND USE OF UTILITY SERVICES

A. The Government shall make all reasonably required amounts of utilities available to the Contractor without charge, from existing outlets and supplies, as specified in the contract. The Contractor shall carefully conserve any utilities furnished without charge.
B. The Contractor, at Contractor's expense and in a workmanlike manner satisfactory to the Contracting Officer, shall install and maintain all necessary temporary connections and distribution lines. Before final acceptance of the work by the Government, the Contractor shall remove all the temporary connections, distribution lines and associated paraphernalia.
C. Electricity (for Construction): Furnish all temporary electric services.

1. Obtain electricity by connecting to the Medical Center electrical distribution system. Electricity for all uses is available at no cost to the Contractor.

D. Water (for Construction and Testing): Furnish temporary water service.
   1. Obtain water by connecting to the Medical Center water distribution system. Provide reduced pressure backflow preventer at each connection. Water is available at no cost to the Contractor.
   2. Maintain connections, pipe, fittings and fixtures and conserve water-use so none is wasted. Failure to stop leakage or other wastes will be cause for revocation (at COTR's discretion) of use of water from Medical Center's system.

1.17 HISTORIC PRESERVATION

Where the Contractor or any of the Contractor's employees, prior to, or during the construction work, are advised of or discover any possible archeological, historical and/or cultural resources, the Contractor shall immediately notify the COTR verbally, and then with a written follow up.

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SECTION 01 33 23
SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES

1-1. Refer to Articles titled SPECIFICATIONS AND DRAWINGS FOR CONSTRUCTION (FAR 52.236-21) and, SPECIAL NOTES (VAAR 852.236-91), in GENERAL CONDITIONS.

1-2. For the purposes of this contract, samples, test reports, certificates, and manufacturers' literature and data shall also be subject to the previously referenced requirements. The following text refers to all items collectively as SUBMITTALS.

1-3. Submit for approval, all of the items specifically mentioned under the separate sections of the specification, with information sufficient to evidence full compliance with contract requirements. Materials, fabricated articles and the like to be installed in permanent work shall equal those of approved submittals. After an item has been approved, no change in brand or make will be permitted unless:

A. Satisfactory written evidence is presented to, and approved by Contracting Officer, that manufacturer cannot make scheduled delivery of approved item or;
B. Item delivered has been rejected and substitution of a suitable item is an urgent necessity or;
C. Other conditions become apparent which indicates approval of such substitute item to be in best interest of the Government.

1-4. Forward submittals in sufficient time to permit proper consideration and approval action by Government. Time submission to assure adequate lead time for procurement of contract - required items. Delays attributable to untimely and rejected submittals will not serve as a basis for extending contract time for completion.

1-5. Submittals will be reviewed for compliance with contract requirements by Architect-Engineer, and action thereon will be taken by COTR on behalf of the Contracting Officer.

1-6. Upon receipt of submittals, Architect-Engineer will assign a file number thereto. Contractor, in any subsequent correspondence, shall refer to this file and identification number to expedite replies relative to previously approved or disapproved submittals.

1-7. The Government reserves the right to require additional submittals, whether or not particularly mentioned in this contract. If additional submittals beyond those required by the contract are furnished pursuant to request therefor by Contracting Officer, adjustment in contract price and time will be made in accordance with Articles titled CHANGES (FAR 52.243-4) and CHANGES - SUPPLEMENT (VAAR 852.236-88) of the GENERAL CONDITIONS.

1-8. Schedules called for in specifications and shown on shop drawings shall be submitted for use and information of Department of Veterans Affairs and Architect-Engineer. However, the Contractor shall assume responsibility for coordinating and verifying schedules. The Contracting Officer and Architect- Engineer assumes no responsibility for checking schedules or layout drawings for exact sizes, exact numbers and detailed positioning of items.

1-9. Submittals must be submitted by Contractor only and shipped prepaid. Contracting Officer assumes no responsibility for checking quantities or exact numbers included in such submittals.

A. Submit samples in single units unless otherwise specified. Submit shop drawings, schedules, manufacturers' literature and data, and certificates in quadruplicate, except where a greater number is specified.
B. Submittals will receive consideration only when covered by a transmittal letter signed by Contractor. Letter shall be sent via first class mail and shall contain the list of items, name of Medical Center, name of Contractor, contract number, applicable specification paragraph numbers, applicable drawing numbers (and other information required for exact identification of location for each item), manufacturer and brand, ASTM or Federal Specification Number (if any) and such additional information as may be required by specifications for particular item being furnished. In addition, catalogs shall be marked to indicate specific items submitted for approval.
   1. A copy of letter must be enclosed with items, and any items received without identification letter will be considered "unclaimed goods" and held for a limited time only.
   2. Each sample, certificate, manufacturers' literature and data shall be labeled to indicate the name and location of the Medical Center, name of Contractor, manufacturer, brand, contract number and ASTM or Federal Specification Number as applicable and location(s) on project.
   3. Required certificates shall be signed by an authorized representative of manufacturer or supplier of material, and by Contractor.
C. If submittal samples have been disapproved, resubmit new samples as soon as possible after notification of disapproval. Such new samples shall be marked "Resubmitted Sample" in addition to containing other previously specified information required on label and in transmittal letter.
D. Approved samples will be kept on file by the COTR at the site until completion of contract, at which time such samples will be delivered to Contractor as Contractor's property. Where noted in technical sections of specifications, approved samples in good condition may be used in their proper locations in contract work. At completion of contract, samples that are not approved will be returned to Contractor only upon request and at Contractor's expense. Such request should be made prior to completion of the contract. Disapproved samples that are not requested for return by Contractor will be discarded after completion of contract.
E. Submittal drawings (shop, erection or setting drawings) and schedules, required for work of various trades, shall be checked before submission by technically qualified employees of Contractor for accuracy, completeness and compliance with contract requirements. These drawings and schedules shall be stamped and signed by Contractor certifying to such check.
   1. For each drawing required, submit one legible photographic paper or vellum reproducible.
   2. Reproducible shall be full size.
   3. Each drawing shall have marked thereon, proper descriptive title, including Medical Center location, project number, manufacturer's number, reference to contract drawing number, detail Section Number, and Specification Section Number.
   4. A space 120 mm by 125 mm (4-3/4 by 5 inches) shall be reserved on each drawing to accommodate approval or disapproval stamp.
   5. Submit drawings, ROLLED WITHIN A MAILING TUBE, fully protected for shipment.
   6. One reproducible print of approved or disapproved shop drawings will be forwarded to Contractor.
   7. When work is directly related and involves more than one trade, shop drawings shall be submitted to Architect-Engineer under one cover.

1-10. Samples, shop drawings, test reports, certificates and manufacturers' literature and data, shall be submitted for approval to
Howard + Helmer architecture
(Architect-Engineer)
3500 North Rock Road, Bldg. 500

(A/E P.O. Address)
Wichita , KS 67226
(City, State and Zip Code)

1-11. At the time of transmittal to the Architect-Engineer, the Contractor shall also send a copy of the complete submittal directly to the COTR.

1-12. Samples for approval shall be sent to Architect-Engineer, in care of COTR, VA Medical Center,
5500 E. Kellogg
(P.O. Address)
Wichita, KS 67218
(City, State and Zip Code)

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SECTION 01 42 19
REFERENCE STANDARDS

PART 1 - GENERAL

1.1 DESCRIPTION

This section specifies the availability and source of references and standards specified in the project manual under paragraphs APPLICABLE PUBLICATIONS and/or shown on the drawings.

1.2 AVAILABILITY OF SPECIFICATIONS LISTED IN THE GSA INDEX OF FEDERAL SPECIFICATIONS, STANDARDS AND COMMERCIAL ITEM DESCRIPTIONS FPMR PART 101-29 (FAR 52.211-1) (AUG 1998)

A. The GSA Index of Federal Specifications, Standards and Commercial Item Descriptions, FPMR Part 101-29 and copies of specifications, standards, and commercial item descriptions cited in the solicitation may be obtained for a fee by submitting a request to – GSA Federal Supply Service, Specifications Section, Suite 8100, 470 East L'Enfant Plaza, SW, Washington, DC 20407, Telephone (202) 619-8925, Facsimile (202) 619-8978.

B. If the General Services Administration, Department of Agriculture, or Department of Veterans Affairs issued this solicitation, a single copy of specifications, standards, and commercial item descriptions cited in this solicitation may be obtained free of charge by submitting a request to the addressee in paragraph (a) of this provision. Additional copies will be issued for a fee.

1.3 AVAILABILITY FOR EXAMINATION OF SPECIFICATIONS NOT LISTED IN THE GSA INDEX OF FEDERAL SPECIFICATIONS, STANDARDS AND COMMERCIAL ITEM DESCRIPTIONS (FAR 52.211-4) (JUN 1988)

The specifications and standards cited in this solicitation can be examined at the following location:

DEPARMENT OF VETERANS AFFAIRS
Office of Construction & Facilities Management
Facilities Quality Service (00CFM1A)

811 Vermont Avenue, NW - Room 462
Washington, DC 20420
Telephone Numbers: (202) 461-8217 or (202) 461-8292
Between 9:00 AM - 3:00 PM

1.4 AVAILABILITY OF SPECIFICATIONS NOT LISTED IN THE GSA INDEX OF FEDERAL SPECIFICATIONS, STANDARDS AND COMMERCIAL ITEM DESCRIPTIONS (FAR 52.211-3) (JUN 1988)

The specifications cited in this solicitation may be obtained from the associations or organizations listed below.

AAMA	American Architectural Manufacturer's Association http://www.aamanet.org
ANSI	American National Standards Institute, Inc. http://www.ansi.org
ASTM	American Society for Testing and Materials http://www.astm.org
FM	Factory Mutual Insurance http://www.fmglobal.com
ICBO	International Conference of Building Officials http://www.icbo.org
NAAMM	National Association of Architectural Metal Manufacturers http://www.naamm.org
NEC	National Electrical Code See – NFPA National Fire Protection Association
NFPA	National Fire Protection Association http://www.nfpa.org
OSHA	Occupational Safety and Health Administration Department of Labor http://www.osha.gov
SMACNA	Sheet Metal and Air-Conditioning Contractors National Association, Inc. http://www.smacna.org

UBC The Uniform Building Code
See ICBO

UL Underwriters' Laboratories Incorporated
http://www.ul.com

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SECTION 07 01 50.23
ROOFING REMOVAL

PART 1 - GENERAL

1.1 DESCRIPTION:

A. This section specifies demolition and removal of roofing and debris and includes the following:
   1. Removal (to the deck) and disposal of the existing roof system off site.
   2. Removal of all loose aggregate and debris by powerbrooming or roof vacuum.
   3. Removal of any constricting debris from gutters, downspouts, drains and piping.
   4. Trimming and resecuring of existing construction details to accommodate new roof system.
   5. Roof deck inspection, repair and replacement.

1.2 RELATED WORK:

A. Safety Requirements: GENERAL CONDITIONS Article, ACCIDENT PREVENTION.
B. Disconnecting utility services prior to demolition: Section 01 00 00, GENERAL REQUIREMENTS.
C. Reserved items that are to remain the property of the Government: Section 01 00 00, GENERAL REQUIREMENTS.
D. Infectious Control: Section 01 00 00, GENERAL REQUIREMENTS, Article 1.8, INFECTION PREVENTION MEASURES.

1.3 PROTECTION:

A. Perform demolition in such manner as to eliminate hazards to persons and property; to minimize interference with use of adjacent areas, utilities and structures or interruption of use of such utilities; and to provide free passage to and from such adjacent areas of structures. Comply with requirements of GENERAL CONDITIONS Article, ACCIDENT PREVENTION.
B. Provide safeguards, including warning signs, barricades, temporary fences, warning lights, and other similar items that are required for protection of all personnel during demolition and removal operations. Comply with requirements of Section 01 00 00, GENERAL REQUIREMENTS, Article 1.10 PROTECTION OF EXISTING VEGETATION, STRUCTURES, EQUIPMENT, UTILITIES AND IMPROVEMENTS.
C. Maintain fences, barricades, lights, and other similar items around exposed excavations until such excavations have been completely filled.
D. Provide enclosed dust chutes with control gates from each floor to carry debris to truck beds and govern flow of material into truck. Provide overhead bridges of tight board or prefabricated metal construction at dust chutes to protect persons and property from falling debris.
E. Minimize spread of flying particles and dust. Cover or sprinkle rubbish and debris with water to keep dust to a minimum. Do not use water if it results in hazardous or objectionable condition such as, but not limited to; ice, flooding, or pollution.
F. In addition to previously listed fire and safety rules to be observed in performance of work, include following:
   1. Wherever a cutting torch or other equipment that might cause a fire is used, provide and maintain fire extinguishers nearby ready for immediate use. Instruct all possible users in use of fire extinguishers.
   2. Keep hydrants clear and accessible at all times. Prohibit debris from accumulating within a radius of 4500 mm (15 feet) of fire hydrants.
G. Before beginning any demolition work, the Contractor shall survey the site and examine the drawings and specifications to determine the extent

of the work. The contractor shall take necessary precautions to avoid damages to existing items to remain in place, to be reused, or to remain the property of the Medical Center; any damaged items shall be repaired or replaced as approved by the COTR. The Contractor shall ensure that structural elements are not overloaded.

H. The work shall comply with the requirements of Section 01 00 00, GENERAL REQUIREMENTS, Article 1.8 INFECTION PREVENTION MEASURES.

1.4 SUBMITTALS:

A. Schedule: Submit proposed schedule coordination for shut-off, capping, and continuation of utility services as required. Provide a detailed sequence of demolition and removal work to ensure uninterrupted progress of Owner's on-site operations.

1.5 JOB CONDITIONS:

A. Condition of Structures: Owner assumes no responsibility for actual condition of materials to be demolished.

B. Conditions existing at time of inspection for bidding purpose will be maintained by Owner insofar as practicable. However, variations may occur by Owner's operations prior to start of work.

C. Traffic: Conduct demolition operations and removal of debris to ensure minimum interference with roads, streets, walks, and other adjacent occupied or used facilities.

D. Do not close or obstruct streets, walks or other occupied or used facilities without permission from authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways if required by COTR.

PART 2 - PRODUCTS

2.1 MATERIALS: DECK REPAIR OR REPLACEMENT ONLY

A. Wood Deck: Shall duplicate existing wood thickness and profiles.

B. Deck Attachment Screws: Shall be self-drilling, self-tapping, high carbon zinc plated #12 screws or larger sized to correct length and designated to be used for securing deck to structural framing.

PART 3 – EXECUTION

3.1 PREPARATION

A. Any and all damages to adjacent areas remaining caused by the Contractor during demolition shall be corrected at the Contractor's expense.

B. Limit size of work sections to safeguard adjacent materials and structures, and to minimize dust and noise.

C. Protect existing facilities from damage during work. Do not overload existing paving, curbs, and sidewalk, or new or existing construction with demolition debris, equipment, vehicles, and containers.

D. Construct a disposal chute, to avoid damage to building or grounds.

E. Disposal chute shall be erected in location acceptable to the Architect.

F. Excessive dust, generated by demolition, shall not be acceptable.

G. Demolition adjacent to areas to remain shall be performed in a neat manner with straight lines to facilitate tie-ins of replacement materials.

H. Demolition shall be performed by personnel familiar with the replacement of materials being removed.

I. Excessive demolition, as determined by Owner, shall be replaced with similar and equal materials at Contractor's expense.

J. Contractor shall furnish necessary temporary protection from weather to protect interior of building from elements of weather at all times.

K. Contractor shall maintain required safety precautions during performance of work.

L. Due to unacceptable water intrusion during the execution of the project, the Contractor shall:
   1. Continuously monitor all work to insure that at no time are more areas exposed than can be made completely watertight prior to water intrusion due to sudden rains, discharge water due to operations, damage caused by the Contractor to existing process piping, ponding water or water existing within the roofing system.
   2. At all times maintain an experienced crew in sufficient number with readily available materials to insure the above.
   3. At no time leave exposed areas unattended without making water tight repairs.
   4. Provide continuous and effective protection of building contents from water or debris by use of acceptable sheet materials and methods during this project. Coordinate these activities with Owner's personnel.

M. Remove all loose or constricting debris from gutters, outlet tubes, and downspouts as necessary to restore original capacity.

N. Trim or raise existing construction features to accommodate a minimum finished flashing height of 6 inches as designated by Architect.

3.2 DEMOLITION: ROOF REMOVAL

A. Cut out and remove existing roof system down to the deck as indicated on drawings and/or additionally required. Work from the drains or lowest level toward higher levels.

B. Remove as much roof as can be totally replaced in the same day. The Contractor shall plan his work day and take whatever action necessary to prevent water entry to the building during roof replacement.

C. Replacement section shall be terminated with water cut-offs where new roof butts up to the old and shall overlap existing roof at least one foot. Water invasion beneath finished work is unacceptable.

D. Debris, including roofing, metals and similar materials shall become property of Contractor and shall be disposed of by him daily, off the Medical Center to avoid accumulation at the demolition site. Materials that cannot be removed daily shall be stored in areas specified by the COTR. Contractor shall dispose debris in compliance with applicable federal, state or local permits, rules and/or regulations.

3.3 INSPECTION OF ROOF DECK

A. Carefully examine deck in area of removal to assure it is sound and dry. Where deck repair or replacement is required, it shall be completed as described in this section on a unit cost basis as directed by the architect.

3.4 ROOF DECK REPAIR AND REPLACEMENT

A. Deck Replacement: Deck shall be secured with approved deck fasteners to a minimum of 3 supporting members.

3.5 CLEAN-UP:

A. On completion of work of this section and after removal of all debris, leave site in clean condition satisfactory to COTR.

B. Clean-up shall include off the Medical Center Property disposal of all items and materials not required to remain property of the Government as well as all debris and rubbish resulting from demolition operations.

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SECTION 07 22 00
ROOF AND DECK INSULATION

PART 1 - GENERAL

1.1 DESCRIPTION
A. Installation of roof and deck insulation, and roof board on existing construction ready to receive roofing membrane.

1.2 RELATED WORK
A. Sheet metal components: Section 07 60 00, FLASHING AND SHEET METAL.

1.3 QUALITY CONTROL
A. Supervision of work by persons that are knowledgeable and experienced in roofing. See submittals for documentation of supervisors qualification.
B. Unless specified otherwise, comply with the recommendations of the NRCA "Roofing and Waterproofing Manual" applicable to insulation for storage, handling, and application.

1.4 SUBMITTALS
A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
B. Manufacturer's Literature and Data:
   1. Roof insulation, each type
   2. Roof board.
C. Layout of tapered roof system showing units required.
D. Documentation of supervisors training and experience showing knowledge of roofing procedures.

1.5 DELIVERY, STORAGE AND MARKING
A. Deliver materials to the site in original sealed packages or containers marked with the name and brand, or trademark of the manufacturer or seller.
B. Keep materials dry, and store in dry, weathertight facilities or under canvas tarps. Use of polyethylene or plastic tarps to cover materials is not permitted. Store above ground or deck level on wood pallets. Cover ground under stored materials with plastic tarp.
   1. Store rolled materials (felts, base sheets, paper) on end. Do not store materials on top of rolled material.
   2. Store foam insulation away from areas where welding is being performed and where contact with open flames is possible.
C. Protect from damage from handling, weather and construction operations before, during, and after installation.

1.6 APPLICABLE PUBLICATIONS
A. The publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only.
B. Federal Specifications (Fed. Spec.):
   UU-B-790A.....Building Paper, Vegetable Fiber: (Kraft, Waterproofed, Water Repellent and Fire Resistant)
C. American Society for Testing and Materials (ASTM):
   C208-08.....Cellulosic Fiber Insulating Board
   C209-07.....Test Methods for Cellulosic Fiber Insulating Board

C552-07.....Cellular Glass Thermal Insulation
C726-05.....Mineral Fiber Roof Insulation Board
C728-05.....Perlite Thermal Insulation Board
C1289-08.....Faced Rigid Cellular Polyisocynurate Thermal Insulation Board

D. Factory Mutual Global (FM):
1-28.....Winds Loads to Roof Systems and Roof Deck Securement
P7825-05.....Approval Guide

E. National Roofing Contractors Association (NRCA):
The NRCA Roofing and Waterproofing Manual - Fourth Edition.

F. Underwriters Laboratories, Inc. (UL):
Fire Resistance Directory (2003)

PART 2 - PRODUCTS

2.1 INSULATION

A. Cellular Glass: ASTM C352, Type IV, roof board.
B. Mineral Fiberboard: ASTM C726.
C. Perlite Board: ASTM C728.
D. Isocyanurate Board: ASTM C1289, Type I, Class 2 or Type III.
E. Tapered Roof Insulation System Segments:
1. Fabricate of mineral fiberboard, isocyanurate, perlite board, or cellular glass. Use only one insulation material for tapered sections.
2. Cut to provide high and low points with crickets and slopes as shown.
3. Minimum thickness of tapered sections; 13 mm (1/2 inch), unless manufacturers allow taper to zero mm (inch).

2.2 ROOF BOARD

1. Top surface not less than 13 mm (1/2 inch) thick water and moisture resistant gypsum core with glass mat facings.
a. “Dens-Deck Prime” by G-P Gypsum or equal.

2.3 ADHESIVE

A. As recommended by roofing membrane manufacturer.

2.4 RECOVERED MATERIALS

A. Comply with following minimum content standards for recovered materials:

Material Type	Percent by Weight
Perlite composite board	23 percent post consumer recovered paper
Plastic rigid foams: Polyisocyanurate/polyurethane	
Rigid foam	9 percent recovered material
Glass fiber reinforced	6 percent recovered material
Rock wool material	75 percent recovered material

B. The minimum-content standards are based on the weight (not the volume) of the material in the insulating core only.

PART 3 - EXECUTION

3.1 GENERAL

A. Entire roof deck construction of any section of the building shall be completed before insulation system work is begun. Curbs, blocking, edge strips, and other components which insulation is attached to shall be in place ready to receive insulation and roofing. Coordinate roof insulation operations with roofing and sheet metal work so that insulation is installed to permit continuous roofing operations.
B. Insulation system materials shall be dry and damage free when applied. Do not use broken insulation or insulation with damaged facings. Remove damaged insulation from the site immediately.
C. Dry out surfaces that become wet from any cause during progress of the work before roofing work is resumed. Apply materials only to dry substrates.
D. Except for temporary protection specified, do not apply materials during damp or rainy weather, during excessive wind conditions, nor while moisture (dew, fog, snow, ice) or frost is present in any amount in or on the materials when temperature is below 10 °C (50 °F). Do not apply materials to substrate having temperature of 10 °C (50 °F) or less.
E. Phased construction is not permitted. The complete installation of all flashing, insulation, and roofing shall be completed in the same day except for the area where temporary protection is required when work is stopped.

3.2 SURFACE PREPARATION

A. Sweep decks to broom clean condition. Remove all dust, dirt or debris.
B. Remove projections that might damage materials.
C. Existing Roofs:
   1. Cut and remove existing insulation and vapor retarder for new work to be installed. Clean cut edges and install a temporary seal to cut surfaces.

3.3 SELECTION OF RIGID INSULATION

A. Insulation Type:
   1. Use either cellular glass, mineral fiberboard, perlite board, phenolic board, isocyanurate board, or urethane board or a combination thereof.
   2. Use 6.5 mm (1/4 inch) thick gypsum roof board as a top layer.
   3. Where tapered insulation is used, all insulation shall be factory tapered, except perlite board may be field tapered.

3.4 INSTALLATION OF INSULATION

A. Lay insulating and roof board units with close joints, in regular courses and with cross joints broken. Bed insulation layers adhesive firmly pressed into the hot bitumen. Keep bitumen below surface of insulation to receive single ply roofing.
B. Lay units with long dimension perpendicular to the rolled (longitudinal) direction of the roofing membrane.
C. Cover all insulation installed on the same day by either:
   1. The roofing membrane as specified.
   2. Temporary protection as specified.

D. Seal all cut edges at penetrations and at edges against water penetration.
E. Cut to fit tight against blocking or penetrations.
F. Over Vapor Retarder, or Concrete Deck: Lay insulation in adhesive as specified.

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SECTION 07 31 13
ASPHALT SHINGLES

PART 1 - GENERAL

1.1 DESCRIPTION

This section specifies organic felt and fiberglass asphalt shingles.

1.2 RELATED WORK

A. Counterflashing and flashing of roof projections: Section 07 60 00, FLASHING AND SHEET METAL.

1.3 SUMITTALS

A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
B. Samples: Shingles, each type, color and texture.
C. Manufacturer's Literature and Data:
   1. Shingles, each type
   2. Installation instructions

1.4 DELIVERY AND STORAGE

A. Deliver materials in manufacturer's unopened bundles or containers with the manufacturer's brand and name clearly marked thereon.
B. Shingle bundle wrapping shall bear the label of Underwriters Laboratories, Inc.
C. Store shingles in accordance with manufacturer's printed instructions. Store roll goods on end in an upright position.
D. Keep materials dry, covered completely and protected from the weather.

1.5 APPLICABLE PUBLICATIONS

A. Publications listed below form a part of this specification to the extent referenced. Publications are referenced in the text by the basic designation only.
B. American Society for Testing and Materials (ASTM):

D226-06	Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing
D1970-08	Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection
D2178-04	Asphalt Glass Felt used in Roofing and Waterproofing
D3018-03	Class A Asphalt Shingles Surfaced with Mineral Granules
D3462-07	Asphalt, Shingles Made from Glass Felt and Surfaced with Mineral Granules
F1667-05	Driven Fasteners: Nails, Spikes, and Staples

C. Underwriter’s Laboratories Inc. (UL):

UL790-04	Fire Tests of Roof Covering

PART 2 - PRODUCTS

2.1 SHINGLES

A. Class A: (Fire resistive), per UL790. ASTM D3018, Type I and ASTM 3462, square butt with clipped corners for an exposure of 213 mm (8 3/8″ inches), offset minimum 121 mm (4 3/4 inches), wind resistant, self sealing. Minimum weight: 163.3 Kg/sqm (360 lbs/100 sq. ft.).

1. “Berkshire” by Owens Corning Roofing and Asphalt, LLC or approved equal. Color; Cantebury Black.

2.2 ROOFING NAILS

A. ASTM F1667; Type I, Style 20, galvanized steel, deformed shanks, with heads 9.5 mm to 11 mm (3/8-inch to 7/16-inch) diameter.
B. Use nails 32 mm (1-1/4 inches) long for shingles and 19 mm (3/4-inch long) for felt.

2.3 ROOFING FELT

A. Fiberglass Felt: ASTM D2178.
B. Organic Felt: ASTM D226, TYPE l.

2.4 SELF-SEALING ICE AND WATER BARRIER

A. Class A: (Fire resistive), per UL790. Flexible poly surface and rubberized asphalt, self-adhesive, self-sealing ice and water barrier, 914 mm (36 inch) width, 1 mm (40 mil) thickness. Minimum weight: 163.3 Kg/sqm (360 lbs/100 sq. ft.), ASTM D 1970.

PART 3 EXECUTION

3.1 PREPARATION

A. Roof surfaces shall be sound, reasonably smooth and free from defects which would interfere with roofing installation.
B. Roof accessories, vent pipes and other projections through the roof must be in place and roof flashing installed or ready for installation before laying shingles.

3.2 LAYING

A. Lay felt under shingles over entire roof.
B. Install asphalt felt underlayment, lapping a minimum of 100 mm (four inches) at ends, 50 mm (2 inches) at head and 300 mm (12 inches) over ridge. Extend felt 13 mm (1/2-inch) beyond edges of roof. Nail felt 125 mm (five inches) on centers along laps.
C. At eaves, install strip of 40 mil ice and water barrier not less than 609 mm (24 inches) beyond interior wall line. Overlap the lower edge of eave 6 mm (1/4-inch). At ridges, rakes, valleys, chimneys, mechanical penetrations and other locations indicated, install a full width strip of 40 mil ice and water barrier unless indicated otherwise indicated.
D. Install starter course of roof shingles with tabs reversed. Both starter course and shingles shall overhang lower edge of roof 6 mm (1/4-inch).
E. Lay shingles with maximum exposure of 213 mm (8-3/8 inches). Nail shingles in accordance with manufacturer's published directions.

3.3 METAL DRIP EDGES

A. At rakes, install metal drip edges made of copper specified under Section 07 60 00, FLASHING AND SHEET METAL. Apply the metal drip edge directly over the underlayment along the rakes.
B. Secure metal drip edges with compatible nails spaced not more than 250 mm (10 inches) on center along the inner edges.

3.4 FLASHINGS

Provide metal flashings specified under Section 07 60 00, FLASHING AND SHEET METAL at the intersections of roofs, adjoining walls, or projections through the deck such as chimneys and vent stacks. Give careful attention to the installation of all flashings.

3.5 RIDGE

A. Bend each shingle lengthwise down center to provide equal exposure on each side of ridge. Beginning at one end of ridge, apply shingles with 203 mm (8″ inch) exposure.
B. Secure each shingle with one nail on each side, 210 mm (8-1/2 inches) back from exposed end and one inch up from edge.

3.6 VALLEY FLASHING

A. Install metal valley flashing shown and as specified under Section 07 60 00, FLASHING AND SHEET METAL.
B. Secure valley flashing in accordance with shingle manufacturer's printed instructions.
C. Expose flashing in open portion of valley a minimum of 125 mm (5 inches) and lap the shingles over the flashing a minimum of 125 mm (5 inches).

3.7 ROOF ACCESSORIES

A. Lap shingles over the accessories flashing a minimum of 125 mm (5 inches).

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SECTION 07 54 23
THERMOPLASTIC – POLYOLEFIN ROOFING

PART 1 GENERAL

1.1 DESCRIPTION
A. Fleece-backed Thermoplastic – Polyolefin (TPO) sheet roofing adhered to roof deck.
B. Fire rated roof system.

1.2 RELATED WORK
A. Roof Insulation: Section 07 22 00, ROOF AND DECK INSULATION.
B. Metal cap flashings, copings, fascias, and expansion joints: Section 07 60 00, FLASHING AND SHEET METAL.

1.3 QUALITY ASSURANCE
A. Approved applicator by the membrane roofing system manufacturer, and certified by the manufacturer as having the necessary expertise to install the specific system.
B. Pre-Roofing Meeting:
   1. Prior to any roofing application, hold a pre-roofing meeting arranged by the Contractor and attended by the Roofing Applicator, Contractor, and COTR.
   2. Discuss specific expectations and responsibilities, construction procedures, specification requirements, application, environmental conditions, job and surface readiness, material storage, and protection.
   3. Inspect roof deck at this time to:
      a. Verify that work of other trades which penetrates roof deck is completed.
      b. Determine adequacy of deck anchorage, presence of foreign material, moisture and unlevel surfaces, or other conditions that would prevent application of roofing system from commencing or cause a roof failure.
      c. Examine samples and installation instructions of manufacturer.
      d. Perform pull out test of fasteners (See paragraph 3.2).

1.4 SUBMITTALS
A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
B. Applicators approval certification by manufacturer.
C. Shop Drawings:
   1. Sheet membrane layout.
   2. Fastener pattern, layout, and spacing requirements.
   3. Termination details.
D. Manufacturers installation instructions revised for project.

1.5 DELIVERY, STORAGE AND HANDLING
A. Deliver, store, and handle materials as specified by manufacturer.
B. Store volatile materials separate from other materials with separation to prevent fire from damaging the work, or other materials.

1.6 WARRANTY
Roofing work subject to the terms of the Article “Warranty of Construction”, FAR clause 52.246-21, except extend the warranty period to five years.

1.7 APPLICABLE PUBLICATIONS

A. Publications listed below form a part of this specification to the extent referenced. Publications are referenced in the text by the basic designation only.

B. American Society for Testing and Materials (ASTM):

A167-99 (R2004).....Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet and Strip
B209-07.....Aluminum and Aluminum-Alloy Sheet and Plate
D751-06.....Coated Fabrics
D2103-05.....Polyethylene Film and Sheeting
D2240-05.....Rubber Property - Durometer Hardness
D3884-07.....Abrasive Resistance of Textile Fabrics (Rotary Platform, Double-Head Method)
D4637-04.....EPDM Sheet Used in Single-Ply Roof Membrane
D4586-07.....Asphalt Roof Cement, Asbestos Free
E96-05.....Water Vapor Transmission of Materials
E108-07.....Fire Tests of Roof Coverings
G21-96 (R2002).....Resistance of Synthetic Polymeric Materials to Fungi

C. National Roofing Contractors Association (NRCA):

Fifth Edition - 05.....The NRCA Roofing and Waterproofing Manual.

D. Federal Specifications (Fed. Spec.)

FF-S-107C(2).....Screws, Tapping and Drive
FF-S-111D(1).....Screw, Wood
UU-B-790A.....Building Paper, Vegetable Fiber (Kraft, Waterproofed, Water Repellent and Fire Resistant)

E. Factory Mutual Engineering and Research Corporation (FM):

Annual Issue.....Approval Guide Building Materials

F. Underwriters Laboratories, Inc (UL):

Annual Issue.....Building Materials Directory
Annual Issue.....Fire Resistance Directory

G. Warnock Hersey (WH):

Annual Issue.....Certification Listings

PART 2 - PRODUCTS

2.1 TPO SHEET ROOFING

A. Fleece-backed thermoplastic polyolefin (TPO) reinforced membrane, white color.

B. Additional Properties:

PROPERTY	**TEST METHOD**	**REQUIREMENT**
Shore A Hardness	ASTM D751	± 10
Water Vapor Permeance Tolerance on nominal thickness, %	ASTM E96	0.10 max. perms Water Method
Resistance to microbial surface growth rating	ASTM D3274	9-10 typ.
Fire Resistance	ASTM E108 Class A	No Combustion Beyond Flame/Heat Source

C. Thickness:

1. Use 1.52 mm (0.060-inch) thick sheet for adhered system.

D. Pipe Boots:

1. Molded TPO designed for flashing of round penetrations, 200 mm (8 inch) minimum height.
2. Color same as roof membrane.

2.2 MISCELLANEOUS ROOFING MEMBRANE MATERIALS

A. Sheet roofing manufacturers specified products.
   1. Lap Sealant: Manufacturer sealant for roofing sheet exposed lap edge.
   2. Bonding Adhesives: Compatible with roofing membrane, flashing membrane, insulation, metals, concrete, and masonry for bonding roofing and flashing sheet to substrate.
   3. Fastener Sealer: One part elastomeric adhesive sealant.
   4. Temporary Closure Sealers (Night Sealant): Polyurethane two part sealer.
   5. Primers and Cleaners: As specified by roof membrane manufacturer.
   6. Asphalt Roof Cement: ASTM D4586.

2.3 FASTENERS

A. Fasteners and washers required for securing sheet roofing to deck:
   1. Steel stress plate washers as required by sheet roofing manufacturer:
      a. Coated against corrosion.
      b. Separate or attached to fastener.
      c. Approximately 50 mm (2 inch) diameter or 40 mm x 65 mm (1-1/2 by 2-1/2 inches) rectangular plate with rounded corners, minimum thickness 0.6 mm (0.023-inch).
   2. Fastening strip or batten strip for securing roof membrane to deck:
      a. Stainless steel strip: ASTM A167 type 302 or 304, minimum 0.5 mm (0.018-inch) thick.
      b. Aluminum strip: ASTM B209, minimum 2.4 mm (0.094-inch) thick.
      c. Rounded corners on strips.
      d. Form strips 38 mm (1-1/2 inches) wide, 3000 mm (10 feet) maximum length with 6 mm x 10 mm (1/4 by 3/8 inch) punched slotted holes at 100 mm (4 inch) centers; centered on width of strip. Punch holes 2 mm (1/16 inch) larger than fastener shank when shank is larger than 5 mm (3/16 inch).
   3. Concrete and Masonry Wall Surfaces:
      a. Nail penetration 13 mm (1/2 inch).
   4. Wood:
      a. Screws; Fed. Spec. FF-S-111, Type I, Style 2.5, coated to resist corrosion, length to provide 19 mm (3/4 inch) minimum penetration.
      b. Nails: Barbed shank, galvanized.
   5. Washers: Neoprene backed metal washer 28 mm (1-1/8 inch) minimum diameter.
   6. To Sheet Metal: Self tapping screw; Fed. Spec. FF-S-107, 2 mm (No. 14), sheet metal screw, minimum thread penetration of 6 mm (1/4 inch); stainless steel.

B. Pipe Compression Clamp or Drawband:
   1. Stainless steel or cadmium plated steel drawband.
   2. Worm drive clamp device.

C. Surface mounted base flashing clamp strip:
   1. Stainless steel strip, ASTM A167, type 302 or 304, dead soft temper, minimum 0.5 mm (0.018-inch) thick.
   2. Aluminum strip: ASTM B209 24 mm (.094-inch) thick.
   3. For exposed location, form strips with 6 mm (1/4 inch) wide top edge bent out 45 degrees (for sealant) from 40 mm (1-1/2 inch) wide material; 2400 mm (8 feet) maximum length with slotted 6 mm x 10 mm (1/4 by 3/8-inch) holes punched at 200 mm (8 inch) centers, centered between bend and bottom edges.
   4. For locations covered by cap flashings, form strips 30 mm (1-1/4 inch) wide, 2400 mm (8 feet) maximum length with slotted holes 6 mm x 10 mm (1/4 by 3/8 inch) punched at 200 mm (8 inch) centers, centered on strip width.

2.4 VAPOR RETARDER OR SEPARATION SHEETS

A. Polyethylene film: ASTM D2103, 0.2 mm (6 mils) thick.
B. Building Paper: Fed. Spec. UU-B-790.
   1. Water vapor resistance: Type I, Grade A, Style 4, reinforced.
   2. Water vapor permeable: Type I, Grade D, Style 4, reinforced.

2.5 FLEXIBLE TUBING

A. Closed cell neoprene, butyl polyethylene, vinyl, or polyethylene tube or rod.
B. Diameter approximately 1-1/2 times joint width.

PART 3 - EXECUTION

3.1 GENERAL

A. Do not apply if deck will be used for subsequent work platform, storage of materials, or staging or scaffolding will be erected thereon unless protection provided to distribute loads less than one-half compression resistance of roofing system materials.
   1. Curbs, blocking, edge strips, and other components to which roofing and base flashing is attached in place ready to receive insulation and, roofing.
   2. Coordinate roof operation with sheet metal work and roof insulation work so that insulation and flashing are installed concurrently to permit continuous roofing operations.
   3. Complete installation of flashing, insulation, and roofing in the same day except for the area where temporary protection is required when work is stopped.
B. Phased construction is not permitted. The complete installation of roofing system is required in the same day except for area where temporary protection is required when work is stopped.
C. Dry out surfaces that become wet from any cause during progress of the work before roofing work is resumed.
D. Apply materials only to dry substrates.
E. Except for temporary protection specified, do not apply materials during damp or rainy weather, during excessive wind conditions, nor while moisture (dew, snow, fog, ice, or frost) is present in any amount in or on the materials.
   1. Do not apply materials to substrate having temperature of 4°C (40 degrees F) or less, or when materials applied with the roof require higher application temperature.
   2. Do not apply materials when the temperature is below 4°C (40 degrees F).
F. Temporary Protection:
   1. Install temporary protection consisting of a temporary seal and water cut-offs at the end of each day's work and when work is halted for an indefinite period or work is stopped when precipitation is imminent.
   2. Temporarily seal exposed surfaces of insulation within the roofing membrane.
   3. Do not leave insulation surfaces or edges exposed.
   4. Use polyethylene film or building paper to separate roof sheet from bituminous materials.
   5. Apply the temporary seal and water cut off by extending the roof membrane beyond the insulation and securely embedding the edge of the roof membrane in 6 mm (1/4 inch) thick by 50 mm (2 inches) wide strip of temporary closure sealant (night sealant) and weight edge with sandbags, to prevent displacement; space sandbags not over 2400 mm (8 foot) centers. Check daily to insure temporary seal remains watertight. Reseal open areas and weight down.
   6. Before the work resumes, cut off and discard portions of the roof membrane in contact with roof cement or bituminous materials.

a. Cut not less than 150 mm (6 inches) back from bituminous coated edges or surfaces.
b. Remove temporary polyethylene film or building paper.

7. Remove and discard sandbags contaminated with bituminous products.
8. For roof areas that are to remain intact and that are subject to foot traffic and damage, provide temporary wood walkways with notches in sleepers to permit free drainage.
9. Provide 2 mm (6 mil) polyethylene sheeting or building paper cover over roofing membrane under temporary wood walkways and adjacent areas. Round all edges and corners of wood bearing on roof surface.

3.2 PREPARATION

A. Test pull out resistance of fasteners in deck in the presence of the COTR before starting roofing work. Tests are not required for wood.
   1. Test applicable adhesive type in applicable deck.
   2. Test the pull out resistance with a pull out tester.
   3. Test one location for every 230 m² (2500 square feet) of deck type and level.
   4. Test at locations designated by COTR.
   5. Do not proceed with the roofing work if the pull out resistance of the adhesive is less than specified.
   6. Remove dirt, debris, and surface moisture. Cover or fill voids greater than 6 mm (1/4 inch) wide to provide solid support for roof membrane.
   7. Install separation sheet over bituminous material on deck surface lapping edges and ends 150 mm (6 inches) or as recommended by roof membrane manufacturer.
   8. Do not install of separation sheet beyond what can be covered by roofing membrane each day.
   9. Use polyethylene, or building paper, that will be compatible with seaming method.
   10. Insure separation sheet completely isolates bituminous materials from TPO roofing membrane.
   11. Turn up at penetrations, or other surfaces where bituminous materials occur, to cover bituminous product.
   12. Turn down over edges of blocking at perimeters to cover blocking.

3.3 INSTALLATION OF ROOFING AND FLASHING

A. Do not allow the membrane to come in contact with surfaces contaminated with asphalt, coal tar, oil, grease, or other substances which are not compatible with TPO roofing membrane.
B. If possible, install the membrane so the sheets run perpendicular to the long dimension of the insulation boards.
C. If possible, start at the low point of the roof and work towards the high point. Lap the sheets so the flow of water is not against the edges of the sheet. Coordinate with roof insulation installation.
D. Position the membrane so it is free of buckles and wrinkles.
E. Roll sheet out on deck; inspect for defects as sheet is being rolled out and remove defective areas:
   1. Allow 30 minutes for relaxing before proceeding.
   2. Lap edges and ends of sheets 75 mm (3 inches) or more as recommended by the manufacturer. Clean lap surfaces as specified by manufacturer.
   3. Heat weld splice laps. Apply pressure as required. Seam strength of laps as required by ASTM D4637.
   4. Check seams to ensure continuous adhesion and correct defects.
   5. Finish edges of laps with a continuous beveled bead of lap sealant to sheet edges to provide smooth transition as specified by manufacturer.
   6. Finish seams as the membrane is being installed (same day).
   7. Anchor perimeter to deck or wall as specified.
F. Membrane Perimeter Anchorage:

1. Install batten strip or steel stress plate with fasteners at the perimeter of each roof level, curb flashing, expansion joints and similar penetrations as indicated in accordance with membrane manufacturer's instructions on top of roof membrane to wall or deck.
2. Mechanically fastened as follows:
   a. Top of mechanical fastener set flush with top surface of the nailing strip or stress plate.
   b. Space mechanical fasteners a maximum 300 mm (12 inches) on center.
   c. Start 25 mm (1 inch) from the end of the nailing strip when used.
   d. When strip is cut round edge and corners before installing.
   e. Set fasteners in lap sealant and cover fastener head with fastener sealer including batten strip or stress plate.
   f. Stop fastening strip where the use of the nailing strip interferes with the flow of the surface water, separate by a 150 mm (6 inch) space, then start again.
   g. After mechanically fastening cover and seal with a 225 mm (9 inch) wide strip of flashing sheet. Use splice adhesive on all laps and finish edge with sealant as specified.
   h. At gravel stops turn the membrane down over the front edge of the blocking, cant, or the nailer to below blocking. Secure the membrane to the vertical portion of the nailer; with fasteners spaced not over 150 mm (6 inches) on centers.
   i. At parapet walls intersecting building walls and curbs, secure the membrane to the structural deck with fasteners 150 mm (6 inches) on center or as shown in NRCA manual (Fifth Edition)

G. Adhered System:
1. Apply bonding adhesive in quantities required by roof membrane manufacturer.
2. Fold sheet back on itself, clean and coat the bottom side of the membrane and the top of the deck with adhesive. Do not coat the lap joint area.
3. After adhesive has set according to adhesive manufacturer's application instruction, roll the membrane into the adhesive in manner that minimizes voids and wrinkles.
4. Repeat for other half of sheet. Cut voids and wrinkles to lay flat and clean for repair patch over cut area.

H. Install flashings as the membrane is being installed (same day). If the flashing cannot be completely installed in one day, complete the installation until the flashing is in a watertight condition and provide temporary covers or seals.

I. Flashing Roof Drains:
1. Install roof drain flashing as recommended by the membrane manufacturer, generally as follows:
   a. Adhere the TPO roof membrane to the metal flashing with the membrane manufacturer's recommended bonding adhesive.
2. Turn down the metal drain flashing and EPDM roof membrane into the drain body and install clamping ring and stainer.

J. Installing TPO Base Flashing and Pipe Flashing:
1. Install TPO flashing membranes to pipes, walls or curbs to a height not less than 200 mm (8 inches) above roof surfaces and 100 mm (4 inches) on roof membranes. Install in accordance with NRCA manual:
   a. Adhere flashing to pipe, wall or curb with bonding adhesive.
   b. Form inside and outside corners of TPO flashing membrane in accordance with NRCA manual (Fifth Edition). Form pipe flashing in accordance with NRCA manual (Fifth Edition).
   c. Lap ends not less than 100 mm (4 inches).
   d. By heat welding, splice flashing membranes together and flashing membranes to roof membranes. Finish exposed edges with sealant as specified.
2. Anchor top of flashing to walls or curbs with fasteners spaced not over 150 mm (6 inches) on center. Use surface mounted fastening strip

with sealant on ducts. Use pipe clamps on pipes or other round penetrations.
3. Apply sealant to top edge of flashing.

K. Installing Building Expansion Joints:
1. Install base flashing on curbs as specified.
2. Install flexible tubing 1-1/2 times width of joint over joint. Cover tubing with TPO cover strip adhered to base flashing and lapping base flashing 100 mm (4 inches). Finish edges of laps with sealants as specified.

L. Repairs to membrane and flashings:
1. Remove sections of TPO sheet roofing or flashing that is creased wrinkled or fishmouthed.
2. Cover removed areas, cuts and damaged areas with a patch extending 100 mm (4 inches) beyond damaged, cut, or removed area. Adhesively splice to roof membrane or flashing. Finish edge of lap with sealant as specified.

3.4 FIELD QUALITY CONTROL

A. Examine and probe seams in the membrane and flashing in the presence of the COTR and Membrane Manufacturer's Inspector.
B. Probe the edges of welded seams with a blunt tipped instrument. Use sufficient hand pressure to detect marginal bonds, voids, skips, and fishmouths.
C. Repair areas of welded seams where samples have been taken or marginal bond voids or skips occur.
D. Repair fishmouths and wrinkles by cutting to lay flat and installing patch over cut area extending 100 mm (4 inches) beyond cut.

- - - E N D - - -

SECTION 07 60 00
FLASHING AND SHEET METAL

PART 1 – GENERAL

1.1 DESCRIPTION
A. Replacement of damaged formed sheet metal work for flashing are specified in this section.
B. Match profiles of existing components being replaced.

1.2 RELATED WORK
A. Single ply base flashing system: Section 07 54 23, THERMOPLASTIC-OLEFIN ROOFING.
B. Sealant compound and installation: Section 07 92 00, JOINT SEALANTS.

1.3 APPLICABLE PUBLICATIONS
A. The publications listed below for a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only.
B. American Society for Testing and Materials (ASTM):
A167-99(R 2004).....Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip
B32-04.....Solder Metal
B370-03.....Copper Sheet and Strip for Building Construction
D3656-07.....Insect Screening and Louver Cloth Woven from Vinyl-Coated Glass Yarns
C. American National Standards Institute/Single Ply Roofing Institute (ANSI/SPRI):
ES-1-2003.....Wind Design Standard for Edge Systems Used with Low Slope Roofing Systems
D. Sheet Metal and Air Conditioning Contractors National Association (SMACNA): Architectural Sheet Metal Manual (2003 Edition).
E. National Association of Architectural Metal Manufacturers (NAAMM):
AMP 500-505-88.....Metal Finishes Manual
F. American Architectural Manufacturers Association (AAMA):
605-98.....Voluntary Specification for High Performance Organic Coatings on Architectural Extrusions Panels
G. International Building Code (IBC): 2007 Edition.

PART 2 - PRODUCTS

2.1 MATERIALS
A. Solder: ASTM B32; flux type and alloy composition as required for use with metals to be soldered.
B. Stainless Steel: ASTM A167, Type 302B, dead soft temper.
C. Copper ASTM B370, cold-rolled temper.
D. Fasteners:
1. Use copper, copper alloy, bronze, brass, or stainless steel for copper and copper clad stainless steel, and stainless steel for stainless steel and aluminum alloy. Use galvanized steel or stainless steel for galvanized steel.
2. Nails:
a. Minimum diameter for copper nails: 3 mm (0.109 inch).
b. Minimum diameter for aluminum nails 3 mm (0.105 inch).

c. Minimum diameter for stainless steel nails: 2 mm (0.095 inch) and annular threaded.
d. Length to provide not less than 22 mm (7/8 inch) penetration into anchorage.

3. Rivets: Not less than 3 mm (1/8 inch) diameter.

E. Sealant: As specified in Section 07 92 00, JOINT SEALANTS for exterior locations.

F. Insect Screening: ASTM D3656, 18 by 18 regular mesh.

2.2 SHEET METAL THICKNESS

A. Except as otherwise shown or specified use thickness or weight of sheet metal as follows:

B. Concealed Locations (Built into Construction):
1. Copper: 30g (10 oz) minimum 0.33 mm (0.013 inch thick).
2. Stainless steel: 0.25 mm (0.010 inch) thick.

C. Exposed Locations:
1. Copper: 0.4 Kg (16 oz).
2. Stainless steel: 0.4 mm (0.015 inch).

2.3 FABRICATION, GENERAL

A. Jointing:
1. In general, copper, and stainless steel, except expansion and contraction joints, shall be locked and soldered.
2. Jointing of copper over 0.5 Kg (20 oz) weight or stainless steel over 0.45 mm (0.018 inch) thick shall be done by lapping, riveting and soldering.
3. Joints shall conform to following requirements:
a. Flat-lock joints shall finish not less than 19 mm (3/4 inch) wide.
b. Lap joints subject to stress shall finish not less than 25 mm (one inch) wide and shall be soldered and riveted.
c. Unsoldered lap joints shall finish not less than 100 mm (4 inches) wide.
4. Flat and lap joints shall be made in direction of flow.
5. Soldering:
a. Pre tin both mating surfaces with solder for a width not less than 38 mm (1 1/2 inches) of uncoated copper, stainless steel, and copper clad stainless steel.
b. Wire brush to produce a bright surface before soldering lead coated copper.
c. Treat in accordance with metal producers recommendations other sheet metal required to be soldered.
d. Completely remove acid and flux after soldering is completed.

B. Expansion and Contraction Joints:
1. Fabricate in accordance with the Architectural Sheet Metal Manual recommendations for expansion and contraction of sheet metal work in continuous runs.
2. Space joints as shown or as specified.
3. Space expansion and contraction joints for copper, and stainless steel at intervals not exceeding 7200 mm (24 feet).
4. Fabricate slip-type or loose locked joints and fill with sealant unless otherwise specified.
5. Fabricate joint covers of same thickness material as sheet metal served.

C. Cleats:
1. Fabricate cleats to secure flashings and sheet metal work over 300 mm (12 inches) wide and where specified.

2. Provide cleats for maximum spacing of 300 mm (12 inch) centers unless specified otherwise.
3. Form cleats of same metal and weights or thickness as the sheet metal being installed unless specified otherwise.
4. Fabricate cleats from 50 mm (2 inch) wide strip. Form end with not less than 19 mm (3/4 inch) wide loose lock to item for anchorage. Form other end of length to receive nails free of item to be anchored and end edge to be folded over and cover nail heads.

D. Drips:
1. Form drips at lower edge of sheet metal counter-flashings (cap flashings), fascias, gravel stops, wall copings, by folding edge back 13 mm (1/2 inch) and bending out 45 degrees from vertical to carry water away from the wall.
2. Form drip to provide hook to engage cleat or edge strip for fastening for not less than 19 mm (3/4 inch) loose lock where shown.

E. Edge Strips or Continuous Cleats:
1. Fabricate continuous edge strips where shown and specified to secure loose edges of the sheet metal work.
2. Except as otherwise specified, fabricate edge strips or minimum 0.6 Kg (24 ounce) copper or 0.6 mm (0.024 inch) thick stainless steel.
3. Use material compatible with sheet metal to be secured by the edge strip.
4. Fabricate in 3000 mm (10 feet) maximum lengths with not less than 19 mm (3/4 inch) loose lock into metal secured by edge strip.

F. Edges:
1. Finish exposed edges of flashing with a 6 mm (1/4 inch) hem formed by folding edge of flashing back on itself when not hooked to edge strip or cleat. Use 6 mm (1/4 inch) minimum penetration beyond wall face with drip for through-wall flashing exposed edge.
2. All metal roof edges shall meet requirements of IBC 2003.

G. Metal Options:
1. Where options are permitted for different metals use only one metal throughout.
2. Stainless steel may be used in concealed locations for fasteners of other metals exposed to view.
3. Where copper gravel stops, copings and flashings will carry water onto cast stone, stone, or architectural concrete, or stainless steel.

2.4 FINISH

A. Use same finish on adjacent metal or components and exposed metal surfaces unless specified or shown otherwise.
B. In accordance with NAAMM Metal Finishes Manual, unless otherwise specified.
C. Finish exposed metal surfaces as follows, unless specified otherwise:
1. Copper: Mill finish.
2. Stainless Steel: Finish No. 2B or 2D.

2.5 BASE FLASHING

A. Use metal base flashing at vertical surfaces intersecting roofing without cant strips or where shown.
1. Use either copper, or stainless steel, thickness specified unless specified otherwise.
2. When flashing is over 250 mm (10 inches) in vertical height or horizontal width use either 0.5 Kg (20 oz) copper or 0.5 mm (0.018 inch) stainless steel.

3. Use stainless steel at aluminum roof curbs where flashing contacts the aluminum.
4. Use either copper, or stainless steel at pipe flashings.

B. Fabricate metal base flashing up vertical surfaces not less than 200 mm (8 inch) nor more than 400 mm (16 inch).
C. Fabricate roof flange not less than 100 mm (4 inches) wide unless shown otherwise. When base flashing length exceeds 2400 mm (8 feet) form flange edge with 13 mm (1/2 inch) hem to receive cleats.
D. Form base flashing bent from strip except pipe flashing. Fabricate ends for riveted soldered lap seam joints. Fabricate expansion joint ends as specified.
E. Pipe Flashing: (Other than engine exhaust or flue stack)
1. Fabricate roof flange not less than 100 mm (4 inches) beyond sleeve on all sides.
2. Extend sleeve up and around pipe and flange out at bottom not less than 13 mm (1/2 inch) and solder to flange and sleeve seam to make watertight.
3. At low pipes 200 mm (8 inch) to 450 mm (18 inch) above roof:
a. Form top of sleeve to turn down into the pipe at least 25 mm (one inch).
b. Allow for loose fit around and into the pipe.
4. At high pipes and pipes with goosenecks or other obstructions which would prevent turning the flashing down into the pipe:
a. Extend sleeve up not less than 300 mm (12 inch) above roofing.
b. Allow for loose fit around pipe.

2.6 COUNTERFLASHING (CAP FLASHING OR HOODS)

A. Either copper or stainless steel, unless specified otherwise.
B. Fabricate to lap base flashing a minimum of 100 mm (4 inches) with drip:
1. Form lock seams for outside corners. Allow for lap joints at ends and inside corners.
2. In general, form flashing in lengths not less than 2400 mm (8 feet) and not more than 3000 mm (10 feet).
3. Two-piece, lock in type flashing may be used in-lieu-of one piece counter-flashing.
4. Manufactured assemblies may be used.
5. Where counterflashing is installed at existing work use surface applied type, formed to provide a space for the application of sealant at the top edge.

C. One-piece Counterflashing:
1. Back edge turned up and fabricate to lock into reglet in concrete.
2. Upper edge formed to extend full depth of masonry unit in mortar joint with back edge turned up 6 mm (1/4 inch).

D. Two-Piece Counterflashing:
1. Receiver to extend into masonry wall depth of masonry unit with back edge turned up 6 mm (1/4 inch) and exposed edge designed to receive and lock counterflashing upper edge when inserted.
2. Counterflashing upper edge designed to snap lock into receiver.

E. Surface Mounted Counterflashing; one or two piece:
1. Use at existing or new surfaces where flashing can not be inserted in vertical surface.
2. One piece fabricate upper edge folded double for 65 mm (2 1/2 inches) with top 19 mm (3/4 inch) bent out to form "V" joint sealant pocket with vertical surface. Perforate flat double area against vertical surface with horizontally slotted fastener holes at 400 mm (16 inch) centers between end holes. Option: One piece surface

mounted counter-flashing (cap flashing) may be used. Fabricate as detailed on Plate 51 of SMACNA Architectural Sheet Metal Manual.
3. Two pieces: Fabricate upper edge to lock into surface mounted receiver. Fabricate receiver joint sealant pocket on upper edge and lower edge to receive counterflashing, with slotted fastener holes at 400 mm (16 inch) centers between upper and lower edge.

F. Pipe Counterflashing:
1. Form flashing for water-tight umbrella with upper portion against pipe to receive a draw band and upper edge to form a "V" joint sealant receiver approximately 19 mm (3/4 inch) deep.
2. Fabricate 100 mm (4 inch) over lap at end.
3. Fabricate draw band of same metal as counter flashing. Use 0.6 Kg (24 oz) copper or 0.33 mm (0.013 inch) thick stainless steel or copper coated stainless steel.
4. Use stainless steel bolt on draw band tightening assembly.
5. Vent pipe counter flashing may be fabricated to omit draw band and turn down 25 mm (one inch) inside vent pipe.

G. Where vented edge decks intersect vertical surfaces, form in one piece, shape to slope down to a point level with and in front of edge-set notched plank; then, down vertically, overlapping base flashing.

2.7 HANGING GUTTERS

A. Fabricate gutters of not less than 0.4 Kg 16 oz copper.
B. Fabricate hanging gutters in sections not less than 2400 mm (8 feet) long, except at ends of runs where shorter lengths are required.
C. Building side of gutter shall be not less than 38 mm (1 1/2 inches) higher than exterior side.
D. Gutter Bead: Stiffen outer edge of gutter by folding edge over approximately 19 mm (3/4 inch) toward roof and down approximately19 mm (3/4 inch) unless shown otherwise.
E. Gutter Spacers:
1. Fabricate of same material and thickness as gutter.
2. Fabricate 25 mm (one inch) wide strap and fasten to gutters not over 900 mm (36 inches) on center.
3. Turn back edge up 25 mm (one inch) and lap front edge over gutter bead.
4. Rivet and solder to gutter except rivet and seal to aluminum.

F. Outlet Tubes:
1. Form outlet tubes to connect gutters to conductors of same metal and thickness as gutters extend into the conductor 75 mm (3 inch). Flange upper end of outlet tube 13 mm (1/2 inch).
2. Lock and solder longitudinal seam.
3. Solder tube to gutter.
4. Fabricate basket strainers of same material as gutters.

G. Gutter Brackets:
1. Fabricate of same metal as gutter. Match existing gutter bracket size.
2. Fabricate to gutter profile.
3. Drill two 5 mm (3/16 inch) diameter holes in anchor leg for countersunk flat head screws.

2.8 CONDUCTORS (DOWNSPOUTS)

A. Fabricate conductors of same metal and thickness as gutters in sections approximately 3000 mm (10 feet) long with 19 mm (3/4 inch) wide flat locked seams.
B. Fabricate elbows by mitering, riveting, and soldering. Lap upper section to the inside of the lower piece.

C. Fabricate conductor brackets or hangers of same material as conductor, 2 mm (1/16 inch) thick by 25 mm (one inch) minimum width. Form to support conductors 25 mm (one inch) from wall surface in accordance with Architectural Sheet Metal Manual Plate 34, Design C for rectangular shapes and E for round shapes.
D. Conductor Heads:
   1. Fabricate of same material as conductor.
   2. Fabricate conductor heads to not less than 250 mm (10 inch) wide by 200 mm (8 inch) deep by 200 mm (8 inches) from front to back.
   3. Form front and side edges channel shape not less than 13 mm (1/2 inch) wide flanges with edge hemmed.
   4. Slope bottom to sleeve to conductor or downspout at not less than 60 degree angle.
   5. Extend wall edge not less than 25 mm (one inch) above front edge.
   6. Solder joints for water tight assembly.
   7. Fabricate outlet tube or sleeve at bottom not less than 50 mm (2 inches) long to insert into conductor.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General:
   1. Install flashing and sheet metal items as shown in Sheet Metal and Air Conditioning Contractors National Association, Inc., publication, ARCHITECTURAL SHEET METAL MANUAL, except as otherwise shown or specified.
   2. Apply Sealant as specified in Section 07 92 00, JOINT SEALANTS.
   3. Apply sheet metal and other flashing material to surfaces which are smooth, sound, clean, dry and free from defects that might affect the application.
   4. Remove projections which would puncture the materials and fill holes and depressions with material compatible with the substrate. Cover holes or cracks in wood wider than 6 mm (1/4 inch) with sheet metal compatible with the roofing and flashing material used.
   5. Coordinate with masonry work for the application of a skim coat of mortar to surfaces of unit masonry to receive flashing material before the application of flashing.
   6. Apply a layer of 7 Kg (15 pound) saturated felt followed by a layer of rosin paper to wood surfaces to be covered with copper. Lap each ply 50 mm (2 inch) with the slope and nail with large headed copper nails.
   7. Confine direct nailing of sheet metal to strips 300 mm (12 inch) or less wide. Nail flashing along one edge only. Space nail not over 100 mm (4 inches) on center unless specified otherwise.
   8. Install bolts, rivets, and screws where indicated, specified, or required in accordance with the SMACNA Sheet Metal Manual. Space rivets at 75 mm (3 inch) on centers in two rows in a staggered position. Use neoprene washers under fastener heads when fastener head is exposed.
   9. Coordinate with roofing work for the installation of metal base flashings and other metal items having roof flanges for anchorage and watertight installation.
   10. Nail continuous cleats on 75 mm (3 inch) on centers in two rows in a staggered position.
   11. Nail individual cleats with two nails and bend end tab over nail heads. Lock other end of cleat into hemmed edge.

12. Install flashings in conjunction with other trades so that flashings are inserted in other materials and joined together to provide a water tight installation.
13. Where required to prevent galvanic action between dissimilar metal isolate the contact areas of dissimilar metal with sheet lead, waterproof building paper, or a coat of bituminous paint.

3.2 BASE FLASHING

A. Install where roof membrane type base flashing is not used and where shown.
   1. Install flashing at intersections of roofs with vertical surfaces or at penetrations through roofs, to provide watertight construction.
   2. Install metal flashings and accessories having flanges extending out on top of the built-up roofing before final bituminous coat and roof aggregate is applied.
   3. Set flanges in heavy trowel coat of roof cement and nail through flanges into wood nailers over bituminous roofing.
   4. Secure flange by nailing through roofing into wood blocking with nails spaced 75 mm (3 inch) on centers or, when flange over 100 mm (4 inch) wide terminate in a 13 mm (1/2 inch) folded edge anchored with cleats spaced 200 mm (8 inch) on center. Secure one end of cleat over nail heads. Lock other end into the seam.

B. For long runs of base flashings install in lengths of not less than 2400 mm (8 feet) nor more than 3000 mm (ten feet). Install a 75 mm (3 inch) wide slip type, loose lock expansion joint filled with sealant in joints of base flashing sections over 2400 mm (8 feet) in length. Lock and solder corner joints at corners.

C. Extend base flashing up under counter flashing of roof specialties and accessories or equipment not less than 75 mm (3 inch).

3.3 COUNTERFLASHING (CAP FLASHING OR HOODS)

A. General:
   1. Install counterflashing over and in conjunction with installation of base flashings, except as otherwise specified or shown.
   2. Install counterflashing to lap base flashings not less than 100 mm (4 inch).
   3. Install upper edge or top of counterflashing not less than 225 mm (9 inch) above top of the roofing.
   4. Lap joints not less than 100 mm (4 inch). Stagger joints with relation to metal base flashing joints.
   5. Use surface applied counterflashing on existing surfaces and new work where not possible to integrate into item.
   6. When fastening to concrete or masonry, use screws driven in expansion shields set in concrete or masonry. Use screws to wood and sheet metal. Set fasteners in mortar joints of masonry work.

B. One Piece Counterflashing:
   1. Where flashing is installed at new masonry, coordinate to insure proper height, embed in mortar, and end lap.
   2. Where flashing is installed in reglet in concrete insert upper edge into reglet. Hold flashing in place with lead wedges spaced not more than 200 mm (8 inch) apart. Fill joint with sealant.
   3. Where flashing is surface mounted on flat surfaces.
      a. When top edge is double folded anchor flat portion below sealant "V" joint with fasteners spaced not over 400 mm (16 inch) on center:
         1) Locate fasteners in masonry mortar joints.
         2) Use screws to sheet metal or wood.

b. Fill joint at top with sealant.
4. Where flashing or hood is mounted on pipe.
a. Secure with draw band tight against pipe.
b. Set hood and secure to pipe with a one by 25 mm x 3 mm (1 x 1/8 inch) bolt on stainless steel draw band type clamp, or a stainless worm gear type clamp.
c. Completely fill joint at top with sealant.

C. Two-Piece Counterflashing:
1. Where receiver is installed at new masonry coordinate to insure proper height, embed in mortar, and lap.
2. Surface applied type receiver:
a. Secure to face construction in accordance, with manufacturers instructions.
b. Completely fill space at the top edge of receiver with sealant.
3. Insert counter flashing in receiver in accordance with fabricator or manufacturer's instructions and to fit tight against base flashing.

D. Where vented edge occur install so lower edge of counterflashing is against base flashing.

E. When counter flashing is a component of other flashing install as shown.

3.4 GRAVEL STOPS

A. General:
1. Install gravel stops and fascias with allowance for expansion at each joint; minimum of 6 mm (1/4 inch).
2. Extend roof flange of gravel stop and splice plates not less than four inches out over roofing and nail or screw to wood nailers. Space fasteners on 75 mm (3 inch) centers in staggered pattern.
3. Install continuous cleat for fascia drip edge. Secure with fasteners as close to lower edge as possible on 75 mm (3 inch) centers.
4. Where ends of gravel stops and fascias abut a vertical wall, provide a watertight, flashed and sealant filled joint.
5. Set flange in roof cement when installed over built-up roofing.
6. Edge securement for low-slope roofs: Low-slope membrane roof systems metal edge securement, except gutters, shall be designed in accordance with ANSI/SPRI ES-1, except the basic wind speed shall be determined from Figure 1609, of IBC 2003.

B. Sheet metal gravel stops and fascia:
1. Install with end joints of splice plates sheets lapped three inches.
2. Hook the lower edge of fascia into a continuous edge strip.
3. Lock top section to bottom section for two piece fascia.

C. Corrugated sheet gravel stops and fascia:
1. Install 300 mm (12 inch) wide sheet flashing centered under joint. A combination bottom and cover plate, extending above and beneath the joint, may be used.
2. Hook lower edge of fascia into a continuous edge strip.

D. Scuppers:
1. Install scupper with flange behind gravel stops; leave 6 mm (1/4 inch) joint to gravel stop.
2. Set scupper at roof water line and fasten to wood blocking.
3. Use sealant to seal joint with fascia gravel stops at ends.
4. Coordinate to lap over conductor head and to discharge water into conductor head.

3.5 HANGING GUTTERS

A. Hang gutters with high points equidistant from downspouts. Slope at not less than 1:200 (1/16 inch per foot).

B. Lap joints, except for expansion joints, at least 25 mm (one inch) in the direction of flow. Rivet and seal or solder lapped joints.
C. Support gutters in brackets spaced not more than 600 mm (24 inch) on centers, brackets attached to facial or wood nailer by at least two screws or nails.
   1. For copper gutters use brass or bronze brackets.
   2. Use brass or stainless steel screws.
D. Secure brackets to gutters in such a manner as to allow free movement of gutter due to expansion and contraction.
E. Gutter Expansion Joint:
   1. Locate expansion joints midway between outlet tubes.
   2. Provide at least a 25 mm (one inch) expansion joint space between end baffles of gutters.
   3. Install a cover plate over the space at expansion joint.
   4. Fasten cover plates to gutter section on one side of expansion joint only.
   5. Secure loose end of cover plate to gutter section on other side of expansion joint by a loose-locked slip joint.
F. Outlet Tubes: Set bracket strainers loosely into gutter outlet tubes.

3.6 CONDUCTORS (DOWNSPOUTS)

A. Where scuppers discharge into downspouts install conductor head to receive discharge with back edge up behind drip edge of scupper. Fasten and seal joint. Sleeve conductors to gutter outlet tubes and fasten joint and joints between sections.
B. Set conductors plumb and clear of wall, and anchor to wall with two anchor straps, located near top and bottom of each section of conductor. Strap at top shall be fixed to downspout, intermediate straps and strap at bottom shall be slotted to allow not less than 13 mm (1/2 inch) movement for each 3000 mm (10 feet) of downspout.
C. Install elbows, offsets and shoes where shown and required. Slope not less than 45 degrees.

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SECTION 07 92 00
JOINT SEALANTS

PART 1 - GENERAL

1.1 DESCRIPTION:

Section covers all sealant and caulking materials and their application, wherever required for complete installation of building materials or systems.

1.2 QUALITY CONTROL:

A. Installer Qualifications: An experienced installer who has specialized in installing joint sealants similar in material, design, and extent to those indicated for this Project and whose work has resulted in joint-sealant installations with a record of successful in-service performance.

B. Source Limitations: Obtain each type of joint sealant through one source from a single manufacturer.

C. VOC: Acrylic latex and Silicon sealants shall have less than 50g/l VOC content.

1.3 SUBMITTALS:

A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Manufacturer's installation instructions for each product used.

C. Cured samples of exposed sealants for each color where required to match adjacent material.

D. Manufacturer's Literature and Data:

1. Primers
2. Sealing compound, each type, including compatibility when different sealants are in contact with each other.

1.4 PROJECT CONDITIONS:

A. Environmental Limitations:

1. Do not proceed with installation of joint sealants under following conditions:
   a. When ambient and substrate temperature conditions are outside limits permitted by joint sealant manufacturer or are below 4.4 °C (40 °F).
   b. When joint substrates are wet.

B. Joint-Width Conditions:

1. Do not proceed with installation of joint sealants where joint widths are less than those allowed by joint sealant manufacturer for applications indicated.

C. Joint-Substrate Conditions:

1. Do not proceed with installation of joint sealants until contaminants capable of interfering with adhesion are removed from joint substrates.

1.5 DELIVERY, HANDLING, AND STORAGE:

A. Deliver materials in manufacturers' original unopened containers, with brand names, date of manufacture, shelf life, and material designation clearly marked thereon.

B. Carefully handle and store to prevent inclusion of foreign materials.

C. Do not subject to sustained temperatures exceeding 5° C (40° F) or less than 32° C (90° F).

1.6 DEFINITIONS:

A. Definitions of terms in accordance with ASTM C717 and as specified.

B. Back-up Rod: A type of sealant backing.

C. Bond Breakers: A type of sealant backing.

D. Filler: A sealant backing used behind a back-up rod.

1.7 WARRANTY:

A. Warranty exterior sealing against leaks, adhesion, and cohesive failure, and subject to terms of "Warranty of Construction", FAR clause 52.246-21, except that warranty period shall be extended to two years.

B. General Warranty: Special warranty specified in this Article shall not deprive Government of other rights Government may have under other provisions of Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of Contract Documents.

1.8 APPLICABLE PUBLICATIONS:

A. Publications listed below form a part of this specification to extent referenced. Publications are referenced in text by basic designation only.

B. American Society for Testing and Materials (ASTM):

C717-07.....Standard Terminology of Building Seals and Sealants.

C920-05.....Elastomeric Joint Sealants.

C1193-05.....Standard Guide for Use of Joint Sealants.

C1330-02 (R2007).....Cylindrical Sealant Backing for Use with Cold Liquid Applied Sealants.
D1056-07.....Specification for Flexible Cellular Materials—Sponge or Expanded Rubber.

PART 2 - PRODUCTS

2.1 SEALANTS:

A. S-1:
1. ASTM C920, polyurethane or polysulfide.
2. Type M.
3. Class 25.
4. Grade NS.
5. Shore A hardness of 20-40

B. S-2:
1. ASTM C920, polyurethane or polysulfide.
2. Type M.
3. Class 25.
4. Grade P.
5. Shore A hardness of 25-40.

C. S-6:
1. ASTM C920, silicone, neutral cure.
2. Type S.
3. Class: Joint movement range of plus 100 percent to minus 50 percent.
4. Grade NS.
5. Shore A hardness of 15-20.
6. Minimum elongation of 1200 percent.

2.2 COLOR:

A. Sealants used with exposed masonry shall match color of mortar joints.
B. Sealants used with unpainted concrete shall match color of adjacent concrete.
C. Color of sealants for other locations shall match adjacent finish unless specified otherwise.

2.3 JOINT SEALANT BACKING:

A. General: Provide sealant backings of material and type that are nonstaining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.

B. Cylindrical Sealant Backings: ASTM C1330, of type indicated below and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance:
   1. Type C: Closed-cell material with a surface skin.
C. Elastomeric Tubing Sealant Backings: Neoprene, butyl, EPDM, or silicone tubing complying with ASTM D1056, nonabsorbent to water and gas, and capable of remaining resilient at temperatures down to minus 32° C (minus 26° F). Provide products with low compression set and of size and shape to provide a secondary seal, to control sealant depth, and otherwise contribute to optimum sealant performance.
D. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint where such adhesion would result in sealant failure. Provide self-adhesive tape where applicable.

2.4 PRIMER:

A. As recommended by manufacturer of caulking or sealant material.
B. Stain free type.

2.5 CLEANERS-NON POUROUS SURFACES:

Chemical cleaners acceptable to manufacturer of sealants and sealant backing material, free of oily residues and other substances capable of staining or harming joint substrates and adjacent non-porous surfaces and formulated to promote adhesion of sealant and substrates.

PART 3 - EXECUTION

3.1 INSPECTION:

A. Inspect substrate surface for bond breaker contamination and unsound materials at adherent faces of sealant.
B. Coordinate for repair and resolution of unsound substrate materials.
C. Inspect for uniform joint widths and that dimensions are within tolerance established by sealant manufacturer.

3.2 PREPARATIONS:

A. Prepare joints in accordance with manufacturer's instructions and SWRI.
B. Clean surfaces of joint to receive caulking or sealants leaving joint dry to the touch, free from frost, moisture, grease, oil, wax, lacquer paint, or other foreign matter that would tend to destroy or impair adhesion.
   1. Clean porous joint substrate surfaces by brushing, grinding, blast cleaning, mechanical abrading, or a combination of these methods to

produce a clean, sound substrate capable of developing optimum bond with joint sealants.

2. Remove loose particles remaining from above cleaning operations by vacuuming or blowing out joints with oil-free compressed air. Porous joint surfaces include the following:
   a. Concrete.
   b. Masonry.
3. Remove laitance and form-release agents from concrete.
4. Clean nonporous surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants.
   a. Metal.

C. Do not cut or damage joint edges.

D. Apply masking tape to face of surfaces adjacent to joints before applying primers, caulking, or sealing compounds.
1. Do not leave gaps between ends of sealant backings.
2. Do not stretch, twist, puncture, or tear sealant backings.
3. Remove absorbent sealant backings that have become wet before sealant application and replace them with dry materials.

E. Apply primer to sides of joints wherever required by compound manufacturer's printed instructions.
1. Apply primer prior to installation of back-up rod or bond breaker tape.
2. Use brush or other approved means that will reach all parts of joints.

F. Take all necessary steps to prevent three sided adhesion of sealants.

3.3 BACKING INSTALLATION:

A. Install back-up material, to form joints enclosed on three sides as required for specified depth of sealant.

B. Where deep joints occur, install filler to fill space behind the back-up rod and position the rod at proper depth.

C. Cut fillers installed by others to proper depth for installation of back-up rod and sealants.

D. Install back-up rod, without puncturing the material, to a uniform depth, within plus or minus 3 mm (1/8 inch) for sealant depths specified.

E. Where space for back-up rod does not exist, install bond breaker tape strip at bottom (or back) of joint so sealant bonds only to two opposing surfaces.
F. Take all necessary steps to prevent three sided adhesion of sealants.

3.4 SEALANT DEPTHS AND GEOMETRY:

A. At widths up to 6 mm (1/4 inch), sealant depth equal to width.
B. At widths over 6 mm (1/4 inch), sealant depth 1/2 of width up to 13 mm (1/2 inch) maximum depth at center of joint with sealant thickness at center of joint approximately 1/2 of depth at adhesion surface.

3.5 INSTALLATION:

A. General:
   1. Apply sealants and caulking only when ambient temperature is between 5° C and 38° C (40° and 100° F).
   2. Do not use polysulfide base sealants where sealant may be exposed to fumes from bituminous materials, or where water vapor in continuous contact with cementitious materials may be present.
   3. Do not use sealant type listed by manufacture as not suitable for use in locations specified.
   4. Apply caulking and sealing compound in accordance with manufacturer's printed instructions.
   5. Avoid dropping or smearing compound on adjacent surfaces.
   6. Fill joints solidly with compound and finish compound smooth.
   7. Tool joints to concave surface unless shown or specified otherwise.
   8. Finish paving or floor joints flush unless joint is otherwise detailed.
   9. Apply compounds with nozzle size to fit joint width.
   10. Test sealants for compatibility with each other and substrate. Use only compatible sealant.
B. For application of sealants, follow requirements of ASTM C1193 unless specified otherwise.

3.6 FIELD QUALITY CONTROL:

A. Inspect joints for complete fill, for absence of voids, and for joint configuration complying with specified requirements.

3.7 CLEANING:

A. Fresh compound accidentally smeared on adjoining surfaces: Scrape off immediately and rub clean with a solvent as recommended by the caulking or sealant manufacturer.

B. After filling and finishing joints, remove masking tape.

C. Leave adjacent surfaces in a clean and unstained condition.

3.8 LOCATIONS:

A. Exterior Building Joints, Horizontal and Vertical:

1. Metal to Metal: Type S-1, S-2
2. Metal to Masonry or Stone: Type S-1
3. Wood to Masonry: Type S-1

B. Metal Reglets and Flashings:

1. Flashings to Wall: Type S-6
2. Metal to Metal: Type S-6

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SECTION 26 41 00
FACILITY LIGHTNING PROTECTION

PART 1 - GENERAL

1.1 DESCRIPTION

A. This section specifies the furnishing and installation of a complete master labeled lightning protection system, complying with NFPA 780, UL 96 and UL 96A.
B. The existing building currently has a lightning protection system. Roof is to be replaced so existing roof components shall be removed and reinstalled. Replace any damaged or missing components.

1.2 SUBMITTALS

A. In accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES, submit the following:
B. Qualifications: Submit proof that the installer of the lightning protection system has had suitable and adequate experience installing other lightning protection systems, and is capable of installing the system as recommended by the manufacturer of the equipment.
C. Certification: Two weeks prior to final inspection, submit four copies of the following certifications to the COTR:
   1. Certification that the lightning protection system has been properly installed and tested.
   2. Certification that the lightning protection system has been inspected by a UL representative and has been approved by UL without variation.

1.3 APPLICABLE PUBLICATIONS

A. Publications listed below (including amendments, addenda, revisions, supplements, and errata) form a part of this specification to the extent referenced. Publications are referenced in the text by designation only.
B. National Fire Protection Association (NFPA):
   70-02.....National Electrical Code (NEC)
   780-00.....Standard for the Installation of Lightning Protection Systems
C. Underwriters Laboratories, Inc. (UL):
   96-94.....Lightning Protection Components
   96A-01.....Installation Requirements for Lightning Protection Systems

PART 2 - PRODUCTS

2.1 MATERIALS

A. Attach master labels "A" or "B" to each item by its manufacturer as evidence that the materials have been manufactured in conformance with the UL Standards for master label lightning protection materials.
B. In additional to conformance to UL 96, the component material requirements are as follows:
   1. Conductors: Electrical grade copper.
   2. Air terminals: Solid copper, not less than 9 mm (3/8 inch) diameter, with sharp nickel-plated points.
   3. Ground rods: Copper clad steel, not less than 13 mm (1/2 inch) diameter by 2400 mm (8 feet) long.
   4. Ground plates: Solid copper, not less than 2 mm (1/16 inch) thick.
   5. Tubing: Stiff copper or brass.
C. Anchors and fasteners: Bolt type which are most suitable for the specific anchor and fastener installations.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install the conductors as inconspicuously as practical and with the proper bends.
B. Install the vertical conductors within the concealed cavity of exterior walls. Run the conductors to the exterior at elevations below the finished grade and make the ground connections to the earth outside of the building or stack perimeter.
C. Make connections of dissimilar metal with bimetallic type fittings to prevent electrolytic action.
D. Use the exothermic welding type connections that form solid metal joints in the main vertical and horizontal conductors, and for connections that are not exposed in the finish work.
E. Protect copper conductors with stiff copper or brass tubing, which enclose the conductors from the top to the bottom of the tubing, between 300 mm (one foot) below and 2100 mm (seven feet) above the finished grade.
F. Sheath copper conductors, which pass over cast stone, cut stone, architectural concrete and masonry surfaces, with not less than a 2 mm (1/16 inch) thickness of lead to prevent staining of the exterior finish surfaces.
G. For the earth connections, install ground rods and ground plates, and the conductor connections to them and the main water pipes in the presence of the COTR. For the conductors located outside of the building or stack, install the conductors not less than 600 mm (two feet) below the finished grade.
H. For structural steel buildings, connect the steel framework of the buildings to the main water pipe near the water system entrance to the building.
I. Connect exterior metal surfaces, located within 900 mm (three feet) of the lightning protection system conductors, to the lightning protection system conductors to prevent flashovers.
J. Where shown, use the structural steel framework or reinforcing steel as the main conductor:
    1. Weld or bond the non-electrically-continuous sections together and make them electrically continuous.
    2. Verify the electrical continuity by measuring the ground resistances to earth at the ground level, at the top of the building or stack, and at intermediate points with a sensitive ohmmeter. Compare the resistance readings.
    3. Connect the air terminals together with an exterior conductor connected to the structural steel framework at not more than 18000 mm (60 foot) intervals.
    4. Install ground connections to earth at not more than 18000 mm (60 foot) intervals around the perimeter of the building.
    5. Weld or braze bonding plates, not less than 200 mm (eight inches) square, to cleaned sections of the steel and connect the conductors to the plates.
    6. Do not pierce the structural steel in any manner. Connections to the structural steel shall conform to UL Publication No. 96A.
K. When the lightning protection systems have been installed, have the systems inspected by a UL representative. Obtain and install a UL numbered master label "C" for each of the lightning protection systems at the location directed by the UL representative and the COTR.
L. Where new lightning protection systems connected to an existing lightning protection system without a UL master label, the new portion of the lightning system still requires inspection and labels as specified above for new work.

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